# UNISPACE '82

## A CONTEXT FOR INTERNATIONAL COOPERATION AND COMPETITION

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## A TECHNICAL MEMORANDUM

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MARCH 1983

CONGRESS OF THE UNITED STATES
Office of Technology Assessment
Washington, D. C. 20510

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CONGRESS OF THE UNITED STATES
Office of Technology Assessment
Washington, D.C. 20510

Library of Congress Catalog Card Number 83-600520

For sale by the Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C. 20402

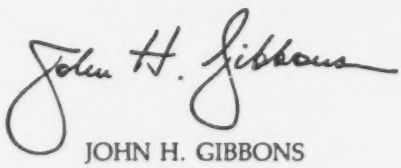
# Preface

Because of concern over the potential adverse effects that UNISPACE '82 might have on U.S. interests in outer space, particularly for the U.S. private sector, the House Committee on Science and Technology and the Joint Economic Committee requested a post-conference review of UNISPACE '82. This technical memorandum constitutes a portion of a major assessment of international cooperation and competition in civilian space activities that was requested by these same committees.

UNISPACE '82, the United Nations Conference on the Exploration and Peaceful Uses of Outer Space, demonstrated that the role of the United States in international space affairs is presently in a stage of transition. The developing world continues to press for access to technological and physical space resources, while our allies and other developed countries now compete for the sale of space technologies heretofore only offered by the United States. As this technical memorandum points out, to use the opportunities that conferences such as UNISPACE '82 present, the United States will have to be better prepared, including formulating a coherent set of long-term domestic policy goals for space. OTA hopes that this technical memorandum will facilitate discussion of ways the Nation can prepare for similar conferences in the future.

A prepublication draft of this technical memorandum was released to the public by the House Committee on Science and Technology for a hearing by the House Committee on Foreign Affairs, February 22, 1983. Relevant events that occurred in the ensuing month are not reflected in this document.

In undertaking this study, OTA sought the contributions of several agencies and a wide spectrum of knowledgeable and interested individuals. More than 75 persons (many of whom are listed in app. K) contributed to this technical memorandum, either to provide data or to review early drafts. OTA gratefully acknowledges their help. We are particularly grateful to our workshop participants. Finally, OTA appreciates the assistance that the Congressional Research Service, the Department of State, the Federal Communications Commission, and the National Aeronautics and Space Administration rendered in this project.



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# Chapter 1
# Summary

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Chapter 1

# Summary

## OVERVIEW

**In August 1982, delegates from 94 countries and several specialized agencies met in Vienna, Austria to discuss the state of space technology, its potential, and the political issues that derive from using it.** Because of their interest in the lessons that might be drawn from U.S. participation in UNISPACE '82, and concern over U.S. leadership in space, the Committee on Science and Technology of the U.S. House of Representatives, and the Joint Economic Committee asked the Office of Technology Assessment (OTA) to prepare this technical memorandum on UNISPACE '82 and related issues. It was undertaken as part of a major assessment of international cooperation and competition in civilian space activities requested by these same committees.

Although UNISPACE '82 was primarily a technical conference centered around space technology, the fact that it was organized by the United Nations (U.N.) and involved 94 countries meant that political issues related to space technology constituted an implicit part of the agenda. **UNISPACE '82 itself is unlikely to have a significant direct effect on the long-term space goals or strategies of the United States. Nevertheless, it offered a window through which to view the development of international space policy, the roles that the United States and its agencies play in this process, and the potential effect of the process on U.S. public and private interests.** In each of these related areas, the United States experienced some successes and some failures; from each it can derive certain important lessons of use to Congress.

## CONTEXT

Over the last quarter century, the United States has been the leader in developing space technology and in exploring outer space. It has played a significant role in establishing the international legal regime to promote the use of outer space for peaceful purposes and for the benefit of all countries, irrespective of their economic status and their degree of scientific and technical development. Through a program of bilateral and multilateral agreements for science and applications, the United States has also led in helping other nations develop their own abilities to reap the benefits of using outer space.

During the last decade, however, **the diplomatic and technological context for space activities has changed, in part because of the very success of U.S. international programs. Today, the U.S. leadership role in international markets and organizations is challenged.**[1] Initially aided by the United States, the Europeans and the Japanese now provide stiff commercial competition in specific space technologies. At the same time, some developing nations have focused on using space technology as a means to greater economic growth, and have demanded a greater voice in its use. Since the United States has had and wishes to continue its leadership role in space, it is important to understand the lessons of UNISPACE '82, and how the United States might make better use of international fora to achieve its diplomatic, commercial, and technical ends. This technical memorandum is limited to discussing these matters in the context of UNISPACE '82. Policy options for dealing with many of the issues developed herein will be explored in the forthcoming OTA assessment, international cooperation and competition in civilian space activities.

[1] *Civilian Space Policy and Applications*, (Washington, D.C.: U.S. Congress, Office of Technology Assessment, June 1982), OTA-STI-144.

## THE CONFERENCE

Cooperation in space for peaceful purposes was the major theme of UNISPACE '82. **Because outer space is by nature and treaty an international realm, what one country does in outer space is necessarily of interest, and perhaps a source of worry, to another.**

Although the primary focus of UNISPACE '82 was on cooperation, competition between nations for commercial markets and/or political prestige also played a background role. **Some of our military allies, most notably Japan and those in Europe, are rapidly building space industries independent of our own. Their emergence as competitors in the exploitation of outer space may result in their also developing political and economic agendas on space that differ in important respects from those of the United States.**

For several reasons the United States had been reluctant to participate in UNISPACE '82, ever since a conference was first proposed in 1974; nevertheless, the United States began to prepare for the conference. However, a major dispute with the Soviets over the succession of a U.S. citizen to Chief of the U.N. Outer Space Affairs Division (OSAD) in the spring of 1981 caused the United States to cease most of its UNISPACE '82 activities and threaten to withdraw from the conference. Until this issue was finally resolved on December 28, 1981, the United States took little part in preparing for UNISPACE '82. It slowed work on its national paper, declined to nominate a UNISPACE '82 Deputy Secretary-General, and allocated no funding for an exhibit or most other related conference expenditures. After reaching agreement about the personnel issue and resuming its preparations for the conference in January 1982, the United States had only 7 months to complete its arrangements and to name a delegation.

The primary tangible output of UNISPACE '82 was a 430-paragraph conference report. It was first submitted in draft by the UNISPACE '82 secretariat in January 1982 and amended in two preparatory meetings of the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) in January and March. By the time of the conference, the wording of all but 15 paragraphs, containing the most controversial issues, had been agreed to through the consensus procedures of COPUOS. Although they had the option of submitting any unresolved issue to a vote, the delegates to UNISPACE '82 agreed to a consensus procedure like that followed in COPUOS. During the conference, agreement was reached on all 15 disputed paragraphs. **In some respects, however, agreement on the text of the conference report was deceptive since it merely left the most important issues* to be resolved at a later date at COPUOS or the U.N. General Assembly.**

*See section on "Major Issues" below.

## THE UNITED STATES AT UNISPACE '82

The United States had much to gain by participating in UNISPACE '82. The conference offered the United States the opportunity to explain its positions on the use of outer space and influence those of other countries, as it simultaneously gained insight into the interests and concerns of others. **However, the preparation and participation at the conference reflected the U.S. approach to other U.N. conferences. The United States has been generally reluctant to concede that its interests can be promoted or seriously jeopardized at such conferences. It approached the UNISPACE '82 warily and attended primarily to "limit the damage" that UNISPACE '82 could cause to U.S. interests.**

- **Conference Preparation.** Although for about 10 months the United States pursued little formal preparation for UNISPACE '82, the United States had developed and established its positions on many of the crucial issues over the years. In Janurary 1982, the National Aeronautics and Space Administration (NASA) assumed an unofficial coordinating role until the State

Department was able to establish a special coordinator's office. The State Department named Ambassador Gerald Helman as Special Coordinator for UNISPACE '82 in mid-March 1982. NASA Administrator James Beggs was named Head of the U.S. Delegation in June. The White House announced the selection of the rest of the delegation in late July, less than 2 weeks before UNISPACE '82.

The United States participated in the January 1982 and March-April 1982 COPUOS preconference meetings where it was able to modify the UNISPACE '82 draft report to accommodate U.S. interests. Unfortunately, partly because of the hiatus in conference preparation, the U.S. delegation was unable to use the full range of outside advisers (e.g., Members of Congress, citizens advisory groups, key persons in the industry, etc.) to assist in forming U.S. positions.

In preparing for the conference, each nation contributed a "Country Paper" describing its current use of and projected needs for space technology. Although the U.S. Country Paper discussed many U.S. achievements, it does not reflect the full range and scope of the U.S. space program, including private involvement in space activities. Nor does it emphasize the full range and depth of good and useful cooperative projects that the United States has entered into with other countries.

- **Conference Participation.** With support from both allies and friends, **the U.S. delegation was highly effective in preventing most wording inimical to U.S. interests from appearing in the conference report. It was less effective in using the conference to further U.S. interests in outer space.**

  The United States has had a longstanding problem of participating effectively at the U.N. and in its related organizations. U.N. conferences are more often perceived as experiences to be tolerated rather than opportunities to influence other countries. **To use the opportunities inherent in international conferences more effectively will require a change in U.S. attitude toward them. Specifically, it will require better preparation, especially for private sector delegates and advisors, and an emphasis on long-term planning.**

- **U.S. Private Sector.** The U.S. private sector has played and will continue to play a major role in the development of space technology and management of space systems. **It is therefore important that the U.S. Government work diligently to take into full account the interests of the private sector in international meetings such as UNISPACE '82.** Private sector advisors, with their valuable technical, organizational, and negotiating skills, can assist delegations by working out innovative positions and gathering international support for these positions. Because the private sector advisors and delegates were selected less than 2 weeks before the conference, there was little time to brief them about the many complex issues to be discussed in Vienna. As a result, some private sector members of the delegation were not well employed at UNISPACE '82; they were underused and given little direction. **As the number and type of private sector space activities increase, it will be desirable to involve the private sector on a continuing basis in space related diplomacy, and arrange for private sector participation in the early and middle stages of conference preparation.**

- **The U.S. Exhibit.** Initially, the private sector was reluctant to exhibit at UNISPACE '82 because firms had not budgeted for it and because their preparation time was highly constrained. This reluctance was overcome by Administration urging and assurances that the Government would support the companies logistically, politically, and materially. In spite of the short preparation time, the firms put on an excellent exhibition.

- **Congressional Involvement.** Because of its responsibility for oversight, the Congress has a longstanding interest in the preparation and conduct of U.S. delegations at international conferences and the results they obtain. Both the House Committee on Science and Technology and the House Committee on Foreign Affairs held hearings on U.S. preparation for UNISPACE '82. In addition, several members of the House of Representatives attended parts of the conference. The hearings revealed that preconference coordination between the rele-

vant congressional committees, NASA, and the State Department could have been improved. Many of the concerns expressed by Members during the hearings regarding the U.S. positions and preparations for UNISPACE '82 might have been allayed had they been kept better informed.

- **U.S. Initiatives.** In spite of the relatively limited time available for the task, the United States prepared several proposals designed to encourage international multilateral cooperation in space. Although it was the only country to offer such proposals, the lack of preparation time and the reluctance of the conference secretariat to help the U.S. delegation, prevented the proposals from gaining wide exposure at UNISPACE '82.

Since the conference the United States has followed through on one of its proposals by holding a 2-day Intergovernmental Meeting of Space Technology Experts in February 1983 (see app. C). The meeting, the first of its kind, was attended by about 100 participants from 40 countries and international organizations; about 15 developing countries were represented. Another proposal, a worldwide study of global habitability, continues to be discussed and planned in the United States; a third proposal, a satellite communcations management seminar, sponsored by Hughes Aircraft under the auspices of the U.S. Telecommunications Training Institute, is scheduled for later this year.

## MAJOR ISSUES

**The issues discussed at UNISPACE '82 were not unique to this conference. Nor are they unique to discussions of the potential benefits and drawbacks of employing space technology.** In fact, nearly all of the most important disagreements have been debated within the specialized agencies and committees of the U.N. since the beginning of the space age. Some of them are directly related to the applications of specific technology or specific systems. Others are more broadly defined and relate to major international economic and political concerns.

### Economic and Political Concerns

- **Economic needs of developing countries.** The discussion at UNISPACE '82 demonstrated that the developing countries of the world not only desire a greater share of the benefits of space systems and services but are willing and able to apply considerable pressure on the industrialized countries to institutionalize the means of transferring space technology and operating skills. However, the conference made no decisions about the most effective means of accomplishing such transfer. In particular, the idea of establishing a U.N. Centre for Outer Space, which had been proposed (and widely supported by a majority of members during the preparatory meetings) to serve the training and information needs of the developing world, was, with little discussion, referred back to the General Assembly. This occurred after the Soviets applied considerable pressure on some developing countries to withdraw their support. Although the United States and most other Western nations did not oppose the Centre, neither did they wish to add to the operating expenses of the U.N. In general, the United States would prefer to handle most cases of technology transfer through bilateral or limited multilateral agreements because these agreements make it possible for the United States to match mutual needs more effectively (see app. B).

Also at stake at UNISPACE '82 were issues, not on the agenda, related to the so-called New International Economic Order (NIEO) and the New World Information Order (NWIO), positions championed by many nations that have banded together in a loose coalition called the "Group of 77 (G-77)." Many of these countries also support the adoption of principles, which did appear on the agenda, that guarantee equitable access to space resources (e.g., the geostationary orbit and any material resources such

as the Moon or other celestial bodies) and protect the sovereign rights of nations through prior consent regimes. The conference report reflects part of their position by asserting in paragraph 11:

> The international community, and in particular the developed countries with more advanced technology should intensify their efforts to promote the wider exploitation of space technology by developing countries.

- **Militarization of Outer Space.** This was the most controversial issue raised at UNISPACE '82. In the opening days of the conference, 90 out of 94 delegations,* representing the entire spectrum of international political orientation, voiced general concern about the increased use of space for military purposes. Most countries are deeply worried about the potential damage of an arms race in space. Although the United States attempted to limit the debate on the grounds that the militarization issue should be discussed in the U.N. Committee on Disarmament, it failed to keep the issue from surfacing time and again. Events at UNISPACE '82 demonstrated that **the United States has yet to develop an effective long-term strategy for responding to international concern about the militarization of outer space.**

  By contrast, the Soviet Union has positioned itself well by appearing to be more responsive to international apprehensions about militarization of space. **Unless the United States undertakes to negotiate about limiting weapons in or for space, it will be in a poor debating position on the issue. "Stonewalling" to avoid discussing militarization, the tactic the United States used at UNISPACE '82, may then be its only practical short-term damage-limiting option.**

- **Private Enterprise in Space.** Because the role of private industry varies among nations, some confusion and suspicion exists over its future part in outer space. Although it was never a subject of debate, the rights and roles of private firms in outer space were implicit questions in many issues that surfaced at UNISPACE '82. Many developing countries, along with the Soviet Union, have attempted to inhibit private enterprise in space by proposing severely restrictive international regulation. Use of private direct broadcast satellites (DBS) and land remote-sensing satellites will continue to generate considerable concern among many nations and lead to continued attempts to subject such operations to internationally formulated governing principles.

*The United States did not mention the issue in its opening statement.

## Technology-Specific Issues

The use of satellites for communications and land remote sensing raise crucial issues about the flow and control of information within and across national borders. Although some developing countries at UNISPACE '82 argued for international regimes to manage the operation of DBS and land remote sensing by satellites, they were unsuccessful. **Even so, the United States can expect continued attempts within the U.N. and its associated agencies to limit the free flow of information. The United States will need long-term as well as short-term strategies for meeting these challenges.**

### Satellite Communications

- **Geostationary Orbit (GSO).** Three potential problems exist: future overcrowding of parts of the orbit, frequency congestion (also related to orbit overcrowding), and claims of sovereignty by the equatorial nations.

  Developing countries raised the issues of possible overcrowding of the orbit and frequency spectrum, and lobbied hard for a priori allotments based on the principle of the equitable use of the orbit.

  With the exception of that portion of the GSO over the Western Hemisphere, there appears to be little pressure on 6/4 GHz positions at the present time. The United States opposes efforts to allot slots in the orbit or frequencies prior to an expressed intention for actual use on the grounds that future technological advances will solve overcrowding problems. The history of technological advances in satellite communications supports the U.S. position.

  In the 1976 Bogota Declaration, several equatorial countries claimed sovereignty over the

GSO, but their claims have been rejected by most other countries. The support that some developing countries give the equatorial claims are inconsistent with their espousal of the principle of global shared use of the GSO. The conference report (par. 281) mentions the equatorials' claims without supporting them. These equatorial countries can be expected to continue to try to use the issue for political leverage in other international meetings.

- **Direct Broadcasting Satellites.** The use of DBS to deliver television programs directly to individual home or village receivers constitutes a powerful medium for providing news, entertainment, education, health care information, and other services to isolated areas. On the other hand, many countries, developing and industrialized alike, recognize the potential DBS has to impose foreign values on a society. Some of these countries have expressed strong interest in regulating its use. Although no decision on this issue was reached at UNISPACE '82, in November 1982 members of the U.N. Special Political Committee voted to refer the matter to the General Assembly. **In December 1982, the General Assembly adopted the set of principles proposed by the Special Political Committee. Though not legally binding, these principles reflect the majority international opinion on DBS.** The resolution notes that "access to the technology should be available to all States without discrimination . . ." and calls for "consultation and agreement between states before establishing an international DBS service."

### Land Remote Sensing

Since the first use of military remote-sensing satellites by the United States and the Soviet Union in the early 1960's, some nations have questioned the right of a country to acquire images of another country and the further right to disseminate such data to a third party. During UNISPACE '82, countries belonging to the G-77 reiterated their concern over these issues. They were successful in retaining wording in the conference report which stated:

> The sensed State shall have timely and non-discriminatory access under reasonable conditions to the primary data obtained by remote sensing . . .

At the same time, these countries wish the United States to maintain a continuous data flow from the Landsat system, and attempted to use UNISPACE '82 to pressure the United States to make such a commitment. It is clear that remote-sensing issues will be of growing concern, as high ground resolution (30 m or less) satellites approach operational status.

## THE AFTERMATH OF UNISPACE '82

Although UNISPACE '82 had no power to enact laws or regulations, it was a forum for discussion and expression of competing interests. It was also a meeting in which individuals interacted, friendships were formed, and critical first impressions and prejudices were established. Past U.S. achievements in space and international cooperative ventures have created good will that could be used to lessen the conflict over issues where the United States differs from other nations, particularly with some members of the G-77. **Unfortunately, the absence of long-term domestic policy goals for space, the difficulties of coordinating strategies among U.S. agencies, and in the specific case of UNISPACE '82, the abbreviated preparation time, have prevented the United States from taking the maximum diplomatic advantage of its space program and using space technology as a tool of foreign policy. Moreover, the United States has allowed itself to become isolated on the military and DBS issues, and its tactics regarding the militarization issue at UNISPACE '82 may well have been overly strident. This is particularly distressing, because space technology is one area in which the United States has an exemplary record in "north-south" relations. It is potentially an area where U.S./developing country agreements, arrived at through equitable negotiation, could be of substantial scientific and economic advantage to all parties.**

Continued opposition to U.S. policies by the developing nations could also have a direct effect on U.S. domestic interests. Concern is high over the issue of prior consent for remote sensing and DBS. Actions in the U.N. General Assembly or one of the related organizations could have a direct effect on the development of a U.S. industry in either of these fields. Developing country activities at the International Telecommunication Union also potentially threaten the large and growing U.S. communications industry. Political restrictions on the free flow of information affect not only the communications industry but could also affect the computer industry.

**UNISPACE '82 was not the cause of any of these problems; it merely illuminates their existence and the necessity for solutions. By its continued and sometimes unnecessary opposition to developing country demands the United States has helped to polarize the international environment. This polarization works to the net disadvantage of the United States.**

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Chapter 2

# The International Environment

Chapter 2

# The International Environment

## INTRODUCTION

From August 9 to 21, 1982, 94 nations met in Vienna, Austria at the U.N. Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE '82) to discuss the state of space technology and its future use for the countries of the world, particularly the developing countries. UNISPACE '82, the second such conference ever held, offered the attending delegations an opportunity to see exhibits illustrating the uses of space technology, and discuss the potential benefits it holds for their countries. It also constituted a forum to raise for general discusson some of the crucial international political, social, and economic questions that the use of space technology engenders.

For the United States, UNISPACE '82 offered an opportunity to demonstrate its mastery of space technology, explain its interests, and influence other countries while gaining insight into their interests and concerns. How did the United States respond to the challenge presented by UNISPACE '82? What is the importance of the conference to the future exploitation of outer space? Will positions taken or stated at this conference affect other international conferences deal-

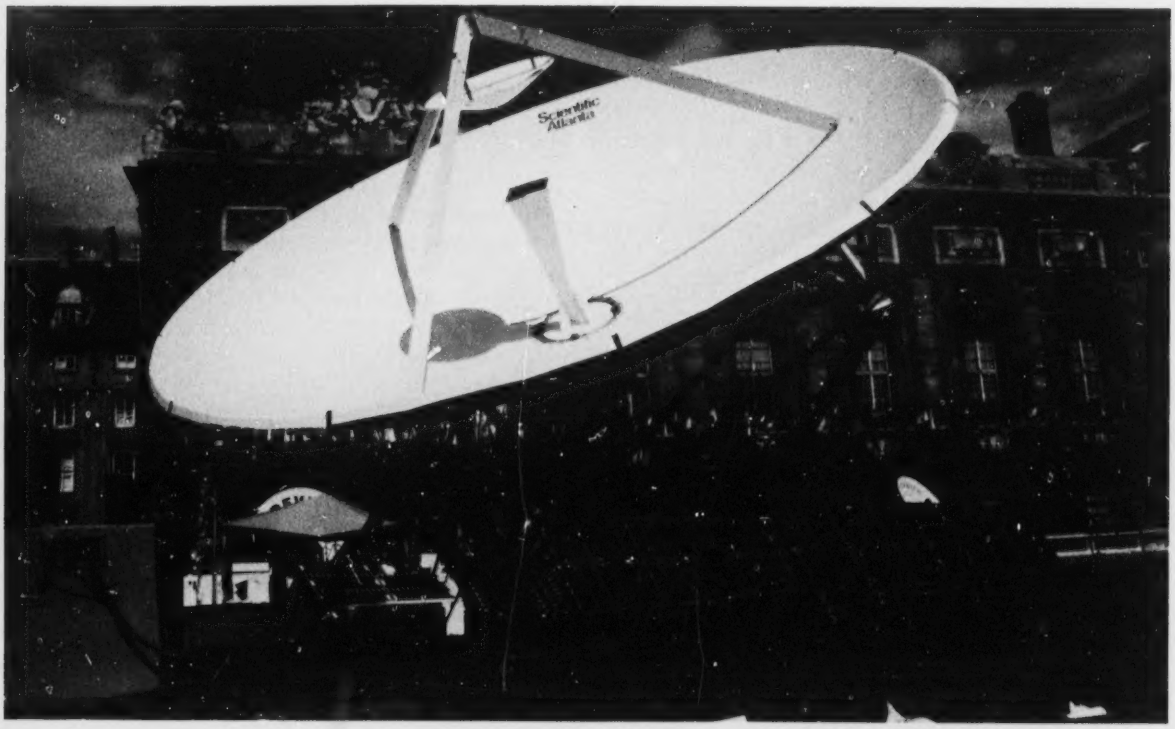

*Photo credit: International Telecommunication Union*

**Solar-Powered Earth Station**—A key to effective rural communications systems is small, low-cost Earth stations. One solution which is being explored by the U.S. Rural Satellite Program is the use of solar panels to power satellite ground stations. Pictured here is a prototype system that was demonstrated in Vienna at UNISPACE '82

ing with science and technology? How can the United States make the best use of the lessons of UNISPACE '82 to enhance its commerce with other countries?

It is within the context of these questions that the Office of Technology Assessment (OTA) prepared this technical memorandum; it was requested by the Committee on Science and Technology of the U.S. House of Representatives and the Joint Economic Committee. The memorandum is part of a forthcoming major assessment of international cooperation and competition in civilian space activities that was requested by these same committees.

UNISPACE '82 illustrated the fact that we now accept access to, and the use of, space technologies as relatively routine. In the 25 years since the Soviet Union and the United States began the space age, several additional countries have created vital, expanding space programs. Some 150 countries are now direct or indirect users of commercial space systems. This is a major change in the context of the use of outer space since the first conference on the Exploration Peaceful Uses of Outer Space and was held in 1968. While the primary focus of UNISPACE '82 was to consider the present and future state of space science, space technology, applications for economic and social development, and cooperative programs, competition by nations for commercial markets and/or political prestige played an important role at both the conference and in the preparations countries made for it.

The lessons of UNISPACE '82 are of particular interest for the United States. As an OTA report on the 1979 World Administrative Radio Conference (WARC '79)[1] stated: "it is highly unlikely that traditional U.S. approaches to these issues (radiofrequency spectrum management in an international forum) will be sufficient to protect U.S. vital interests in the future." This report could make the same statement.

The issues that surfaced in connection with UNISPACE '82 are increasingly evident at other multinational technological conferences. UNISPACE '82 corroborated that significant long-term political trends in communication and space technologies are developing which are inconsistent with presently articulated U.S. interests. The United States must find the means to participate more effectively at similar technological conferences. Not to do so will leave it increasingly isolated from the rest of the world body politic.

In order to collect the data for this report, OTA staff attended the March/April meetings of the Committee on the Peaceful Uses of Outer Space (COPUOS), and the August meeting of UNISPACE '82 itself. It also interviewed more than 75 experts on some facet or other of the issues raised by UNISPACE '82. These included U.S. Government officials, representatives of the aerospace and communications industry, members of foreign governments, and other private citizens. In addition, 70 people from other countries were polled on their views of UNISPACE '82. Additional information was supplied by contractors and by a workshop on UNISPACE '82 held at OTA, November 30, 1982.

Although planned as a scientific and technical conference, UNISPACE '82 also provided the opportunity for nations to examine the political, economic, regulatory, and military aspects of space technology. In order to understand more clearly the issues and the conflicts that arose during the conference, it is useful to examine the international environment in which UNISPACE '82 took place.

[1] *Radiofrequency Use and Management Impacts From the World Administrative Radio Conference of 1979* (Washington, D.C.: U.S. Congress, Office of Technology Assessment, January 1982), OTA-CIT-163, p. 4.

## SPACE APPLICATIONS TECHNOLOGY AND THE INTERNATIONAL COMMUNITY

Since the inception of spaceflight 25 years ago there have been only two full-scale space powers, the United States and the Soviet Union. Each has developed and maintained large and varied programs for civilian and military uses of outer space. However, during the last decade additional coun-

tries have started their own space programs and others have begun to rely more on space-based services:

- **France and Japan,** have expanding national programs that include space transportation, communications, remote sensing, meteorology, and space science systems. Much French research on space has been conducted within the European Space Agency (ESA).
- **Canada, Great Britain, and West Germany, and other European countries have individual programs and also contribute to bilateral and multilateral ventures.** Except for Canada, these are carried out primarily through the ESA.
- **India, Brazil, and China,** newly industrializing countries, have relatively advanced space programs that aim to generate a variety of indigenous space industries and services.
- **A growing number of countries and regional associations** have, or plan, satellite communications systems; these include Indonesia (Palapa A&B), India (Insat), the Middle East (Arabsat), Brazil (Brasilsat), Mexico (Ilhuicahau), Australia (Australsat), and Colombia (Satcol).
- **Many industrialized and developing countries that use space technologies,** primarily through the International Telecommunications Satellite System (INTELSAT); the International Maritime Satellite system (INMARSAT); the Intersputnik network (a Soviet-based communications satellite system); the U.S. Landsat (for land optical sensing); and the U.S. and other meteorological satellites.

Space technology has come to play an increasingly important role in the domestic and international technology policy decisions of countries. Technologically advanced nations have become ever more dependent on space technology to satisfy their domestic and international communication and information gathering needs. Space technology may contribute to domestic prosperity and a favorable balance of trade. Therefore, some less-developed countries view space technology as one means to accelerate their development.

Because the development and use of space technology is a long-term, expensive, and often international undertaking, governments have traditionally been the driver behind the evolution and growth of most space technology. This preeminent government role, combined with the political sensitivity of technologies that by their nature transcend national boundaries, has made the use of space technology the subject of continued international scrutiny. It has, therefore, become increasingly difficult to discuss space technology without discussing political issues.

The importance which nations attach to space systems and services challenges the commercial, diplomatic, and technical skills of the United States. The United States must define how it will respond to new international competition in space services heretofore only offered by the United States.[2]

New challenges in international cooperation also exist. The desire for economic growth and technological independence has prompted the less developed nations to apply pressure on the industrialized states to provide space services and hardware on a fully equitable basis and to institutionalize the means of transfer of this technology within the U.N. system. The major questions posed for the United States are:

- How far should it go to accommodate such demands?
- What advantages are there to doing so?
- What institutional mechanisms (eg., bilateral v. multilateral agreements) can best accommodate both the long-term needs of the United States and those of the less developed nations?

[2] *Civilian Space Policy and Applications* (Washington, D.C.: U.S. Congress, Office of Technology Assessment, June 1982), OTA-STI-177.

## U.S. SPACE TECHNOLOGY AND INTERNATIONAL COMPETITION

As virtually the only supplier of space technology, the United States until recently benefited from the space programs of other nations because they constituted an excellent market for U.S. goods and services. Now, even though the overall market is increasing, other countries with mature space programs compete with us in selling satellite communication systems and services and launching services. They will soon compete in selling remotely sensed data from space and in manufacturing in space. Foreign competition threatens the United States with the loss of significant revenue opportunities as well as with potential loss of prestige and political influence.[3]

**Satellite Communications.**—By far the most developed and commercialized of all space technologies, satellite communications technology was developed in the early 1960's by the National Aeronautics and Space Administration (NASA), the military, and private companies. The creation of INTELSAT in 1964 made satellite communications available to the world and fostered the development of the U.S. satellite industry. (Through COMSAT and other private companies, satellites have come to play a central role in domestic communications as well.)

The future global demand for satellite communication services appears strong. At home, the market for voice, data, and video transmission is growing rapidly, and the advent of direct-broadcast satellite (DBS) systems, recently approved by the Federal Communications Commission for domestic service, will contribute to this growth. Internationally, both developed and developing countries appear eager to make greater use of satellites for regional and domestic communications. But failure of the United States to maintain its technological lead could prevent U.S. industry from capitalizing fully on these opportunities.[4] In 1973, the White House directed NASA to phase out its advanced satellite communications research program. By 1977, the communications industry, prompted by foreign competition, was urging NASA to resume research in advanced communications techniques. Upon congressional approval, NASA reinstituted a limited program in 1978.

One reason for pursuing advanced communications research is the future need to use higher frequencies, such as 30/20 GHz (Ka band), for commercial purposes. While U.S. firms have maintained consistently that the technology is too complex and costly for them to afford, European and Japanese industries, with subsidies from their governments, are already developing 30/20 GHz systems. The virtual certainty that foreign systems will be used in this decade[5] has occasioned debate about whether NASA should undertake a large 30/20 GHz technology research and development (R&D) program, including flight-testing of the hardware. Proponents of a NASA program point out that if the technology is not developed in the United States, U.S. firms will lose an important market as well as their strong lead in communications technology.

**Land Remote Sensing by Satellite.**—Since 1972, the United States has had the world's only global civilian remote-sensing system. At present however, it is uncertain whether the United States will have a civilian land remote-sensing capability after Landsat 5 terminates in the late 1980's. Foreign and domestic users of the Landsat system have expressed concern about the continuity of data from Landsat. It is essential to them that the data flow be continuous and that any price increases to be predictable and incremental.

There are political, technical, budgetary, and institutional problems in Landsat planning. Because Landsat 4 carries new and untried sensors as well as proven ones, one cannot yet be certain that it will provide acceptable operational service. The French, Japanese, and the ESA, on the other hand, plan satellite systems that are expressly designed for commercial operation. Although complete success of these systems is not assured, these systems will use less expensive and more reliable multispectral linear array (MLA) sensor

[3] Ibid.
[4] Ibid.

[5] *Aerospace Daily*, Feb. 7, 1983, p. 1, Japan launched its communications satellite CS-2A on Feb. 4, 1983. It carries four 30/20 GHz transponders for commercial use.

technology, which the United States does not currently plan to use for civilian systems.* The most advanced foreign system is the French Systeme Probetoire Observationale Terrestriale (SPOT), scheduled for launch in 1984; the French have already begun to market future SPOT data products through a semiprivate firm, Spotimage.

**Space Transportation.**—Despite the technological triumph of the space shuttle, need for commercial and Government launch services is likely to exceed the shuttle's availability. If the United States has no expendable vehicles ready to launch commercial satellites at competitive prices, then the private sector, and perhaps Government agencies as well, will be forced to purchase launch services from the Europeans.

The emergence of foreign competition against U.S. launch services is a major change from the past and a competitive challenge for the future. Developed by ESA, the Ariane expendable launcher is being marketed by a French-incorporated company called Arianespace. Several U.S. companies have already announced plans to launch on Ariane rather than on the shuttle. The Japanese now launch their own satellites by means of Delta-class launchers, which they construct under agreements with the U.S. firms that originally produced the rockets. The Soviets and the Chinese also launch their own satellites. The Soviets have offered to place satellites of certain other countries in orbit. Thus, although the market for launch services is growing, foreign launch capability is also growing rapidly.

**Materials Processing in Space (MPS).**—The commercial prospects for producing new or refined products in space, such as pharmaceuticals and metal alloys, are uncertain. To date only one company, McDonnell-Douglas Astronautical Co., has committed itself to a long-term commercial space manufacturing project. The central issues here are the degree and kind of government incentives available to firms that wish to consider MPS.[6] Such incentives can include conducting generic and publicly available R&D on the shuttle or the European-built spacelab, or specific agreements to share the costs and results of MPS efforts. At present, NASA has instituted the Joint-Endeavor Agreement and related arrangements in an effort to stimulate industry's interest in MPS. Several other countries, including Japan and West Germany, have well-developed materials science programs that include ground-based research and eventual plans to use the European-developed spacelab for government-funded experiments.

*Landsat 4 sensors, the multispectral scanner (MSS) and thematic mapper (TM) are semimechanical and are therefore subject to mechanical failure and jitter problems. Multispectral linear array sensors require no mechanical devices.

[6] *Civilian Space Policy and Applications*, op. cit.

## U.S. SPACE TECHNOLOGY AND INTERNATIONAL COOPERATION

International cooperation has been a central element of the U.S. civilian space program since its inception (see app. B). According to the National Aeronautics and Space Act of 1958, space activities should: "be devoted to peaceful purposes for the benefit of all mankind." Further, the U.S. will engage in "cooperation . . . with other nations and groups of nations."

In the past 25 years, the United States has engaged in hundreds of bilateral and multilateral cooperative ventures in every area of space technology. U.S. launchers have orbited complete satellites and instrument payloads for dozens of countries. In 1963, the United States took the lead in establishing INTELSAT and providing satellite communications around the world. U.S. meteorological satellites have been used for global weather coverage since the early 1960's, and the Landsat Earth remote-sensing system has been in operation since 1972 under a policy whereby the United States has sold imagery to any country for little more than the price of reproduction. NASA and the Agency for International Development have cooperated in giving developing countries valuable training in the use of Landsat data, as well as in using satellite communications to deliver programs to rural areas. The Applications Technology Satellite series of experimental DBS was used in the mid-1970's to carry out several impor-

tant studies in India and South America. The National Oceanographic and Atmospheric Administration (NOAA) has cooperated with other countries and with the World Meteorological Organization (WMO) in supplying weather data from satellites free of charge.

More recently, the United States has engaged in a major cooperative project with ESA and Canada to develop the Space Transportation System (STS). In return for access to the space shuttle, ESA has produced Spacelab and the Canadians the Shuttle Remote Manipulator Arm (an essential component of the shuttle's ability to release and retrieve satellites in orbit).

In manned spaceflight, the United States and the Soviet Union cooperated in several projects during the 1970's, culminating in the 1975 Apollo-Soyuz Test Project. In one of the most dramatic symbols of detente, a U.S. Apollo spacecraft docked in orbit with a Soviet Soyuz.

Not all U.S. cooperative ventures have been entirely successful, though. In the early 1970's, the United States made a proposal to the Europeans for the development of a Space Tug; it was later withdrawn for economic and political reasons. In particular, the Air Force did not want the United States to depend on a foreign consortium for a major part of STS. Another difficult venture was the International Solar Polar Mission (ISPM), a dual-spacecraft scientific project being conducted jointly with ESA. For budgetary reasons, the United States withdrew its satellite from the mission in 1981. These setbacks have made some European countries highly skeptical of the U.S. ability to stick to long-term commitments. Cooperation with the Soviet Union has been subject to the ups and downs of East-West relations, and most cooperative projects have recently been cancelled.

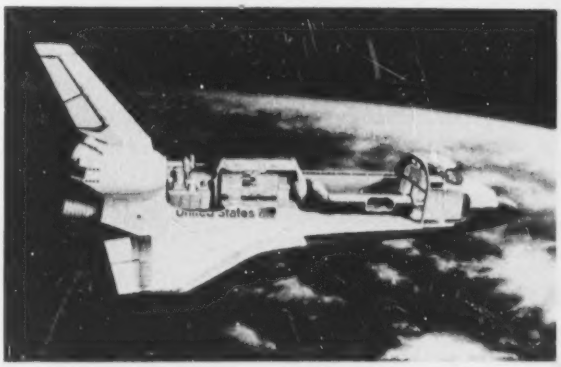

*Photo credit: National Aeronautics and Space Administration*

Artist's conception of Spacelab in the cargo bay of the orbiting space shuttle

## THE INTERNATIONAL REGIME FOR OUTER SPACE

International regulation and coordination of states' activities are supposed to protect common interests and to ensure that special interests are dealt with in a common framework. Given the ever larger number of nations that use or produce space technology, the United States is increasingly affected by decisions taken in other nations and in international organizations (see fig. 1).

The United States is a member of the following international organizations which order and regulate the use of space:

**United Nations Committee on the Peaceful uses of Outer Space.**—COPUOS was established in 1959 with an initial membership of 24 countries, which was expanded to 28 in 1961, 37 in 1973, and 54 today (see table 1). Within COPUOS, decisions are made by consensus, rather than by majority vote. COPUOS is serviced by the U.N. Outer Space Affairs Division, which is part of the U.N. Secretariat and has a small permanent staff (see fig. 2). It has a legal subcommittee and a scientific and technical subcommittee. The legal subcommittee is the primary locus for the discussion of legal principles concerning outer space and development of space treaties. It has formulated five major treaties, for most of which the United States played a leading drafting and negotiating role:

- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (1967).

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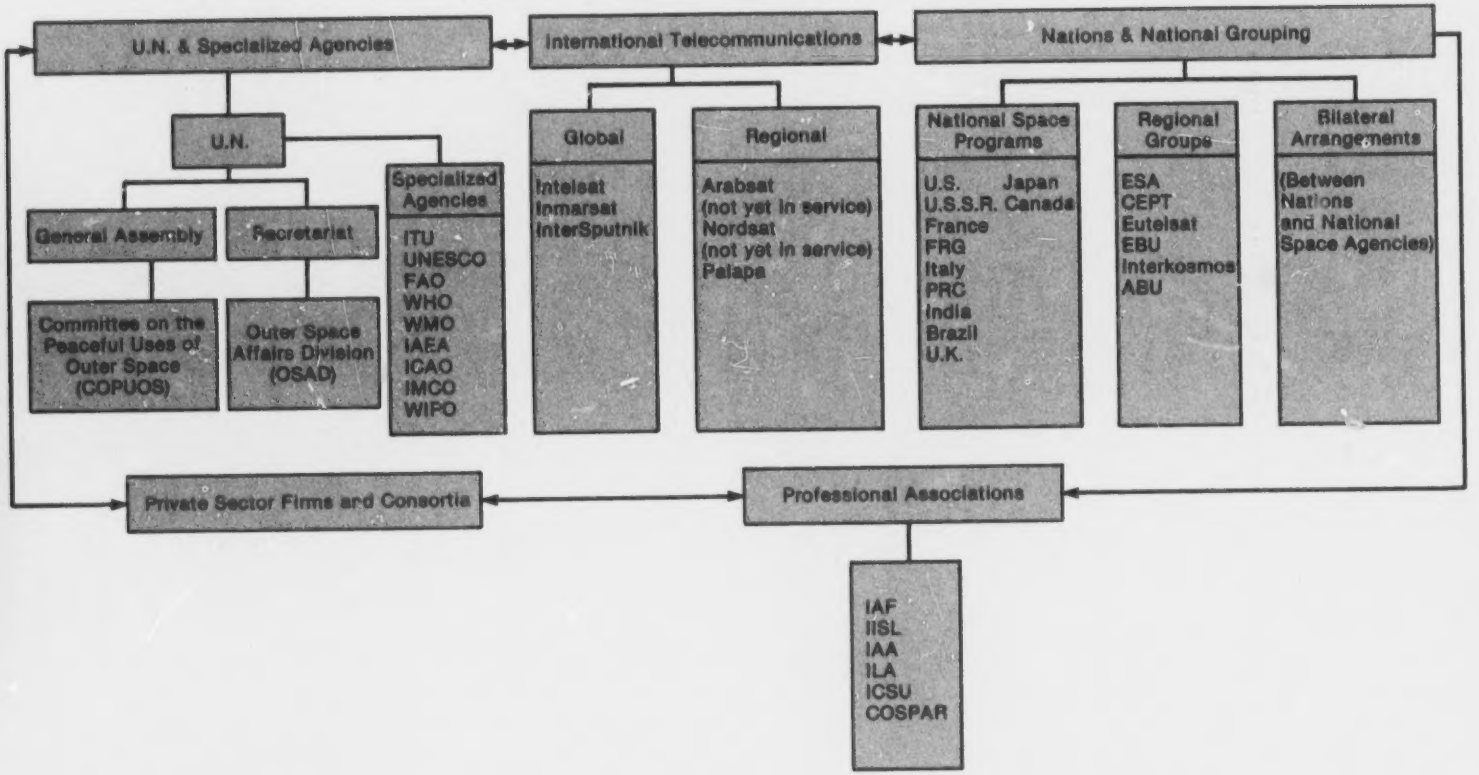
Figure 1.—Patterns of Global Outer Space Activities




SOURCE: Office of Technology Assessment.

**Table 1.—Current Membership of COPUOS†**

| | |
|---|---|
| *Albania* | Kenya |
| *Argentina* | *Lebanon* |
| *Australia* | Mexico |
| *Austria* | Mongolia |
| *Belgium* | *Morocco* |
| Benin | Netherlands |
| *Brazil* | Niger |
| *Bulgeria* | Nigeria |
| *Canada* | Pakistan |
| *Chad* | Philippines |
| Chile | *Poland* |
| China* | *Romania* |
| Columbia | *Sierra Leone* |
| *Czechoslavakia* | Spain |
| Ecuador | Sudan |
| *Egypt* | *Sweden* |
| Federal Republic of Germany | Syria |
| *France* | *United Kingdom* |
| German Democratic Republic | United Republic of Cameroon |
| Greece | *United States** |
| *Hungary* | Upper Volta |
| *India** | Uraguay |
| Indonesia | *U.S.S.R.** |
| *Iran* | Venezuela |
| Iraq | Vietnam |
| *Italy* | Yugoslavia |
| *Japan** | |

NOTE: Italics indicate COPUOS membership 1961-73. Asterisk indicates independent launch capability.
†Greece and Turkey, Spain and Portugal, alternate membership every 3 years.
SOURCE: Office of Technology Assessment.

- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968).
- Convention on International Liability for Damage Caused by Space Objects (1972).
- Convention on Registration of Objects Launched into Outer Space (1974).
- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty) (1979).

With the exception of the 1979 Moon Treaty, the United States has signed and ratified each of these international agreements. COPUOS served as the preparatory committee for the first conference on the Exploration and Peaceful Uses of Outer Space in 1968, and UNISPACE '82; it was the major forum for debate over the UNISPACE '82 conference report prior to the conference.

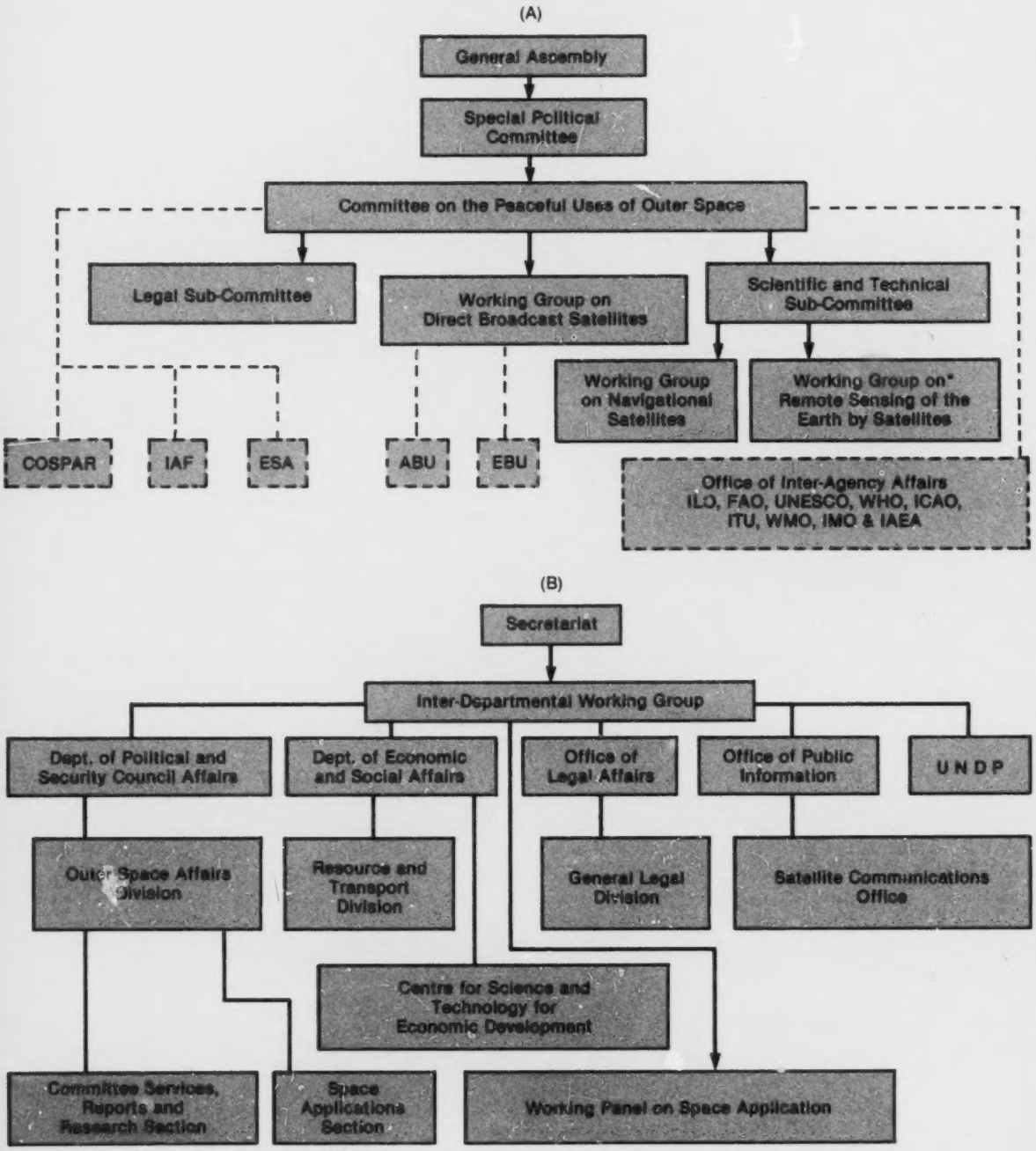
**International Telecommunication Union.**—A specialized agency of the U.N., the ITU is an international intergovernmental organization with 157 members that coordinates and regulates international communications. Its primary task is to allocate frequencies to the various radio services and to register the specific operational assignments. Inherent in the registration process for space radio services is the coordination of the positioning of satellites in the geostationary orbit. The ITU's allocation of the spectrum to particular types of users (e.g., to space services), is done by periodic World and Regional Administrative Radio Conferences (WARCs and RARCs). The last WARC was held in 1979; it was the occasion for considerable conflict between the United States and other countries over frequency allocations and the appropriate placement of satellites in the geostationary orbit.[7]

## Other U.N. Agencies

**U.N. Educational, Scientific and Cultural Organization (UNESCO).**—UNESCO is neither a regulatory agency like ITU, nor does it have a broad

[7] *Radiofrequency Use and Management Impacts From the World Administrative Radio Conference of 1979*, op. cit.

**Figure 2.—U.N. Bodies**


(A)
General Assembly
Special Political Committee
Committee on the Peaceful Uses of Outer Space
Legal Sub-Committee
Working Group on Direct Broadcast Satellites
Scientific and Technical Sub-Committee
Working Group on Navigational Satellites
Working Group on* Remote Sensing of the Earth by Satellites
COSPAR
IAF
ESA
ABU
EBU
Office of Inter-Agency Affairs ILO, FAO, UNESCO, WHO, ICAO, ITU, WMO, IMO & IAEA
(B)
Secretariat
Inter-Departmental Working Group
Dept. of Political and Security Council Affairs
Dept. of Economic and Social Affairs
Office of Legal Affairs
Office of Public Information
U N D P
Outer Space Affairs Division
Resource and Transport Division
General Legal Division
Satellite Communications Office
Centre for Science and Technology for Economic Development
Committee Services, Reports and Research Section
Space Applications Section
Working Panel on Space Application

*Accomplished its original mandate in 1974 but can be recalled at any time by the parent Committee.

NOTE: Broken lines represent observers.

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interest in space matters like COPUOS. However, as the U.N. agency most concerned with scientific and cultural issues, including the use of communications for third world development, it necessarily has an interest in space systems as they relate to these matters. UNESCO is also the focal point for discussions of the New World Information Order (see "The Political Context for Outer Space") and related issues.

**World Meteorological Organization.**—WMO is the chief organization for international coordination in gathering and exchanging weather data. It also organizes and coordinates global weather and climate studies such as World Weather Watch (WWW) and the Global Atmospheric Research Project (GARP). Virtually all of WMO's work involves the use of satellite information.

**Food and Agricultural Organization (FAO).**—FAO has established a remote-sensing center to monitor renewable resources, using Landsat imagery to support its field services. FAO has an extensive library of Landsat data as well as a laboratory for interpreting aerial and satellite images.

**United Nations Development Programme (UNDP).**—UNDP funds a variety of development projects, including training courses and regional centers for broadcasting and resource management. An experimental satellite prototype thin-route communication Earth terminal suited for low-cost mass production is among its current programs.

## THE POLITICAL CONTEXT FOR OUTER SPACE

The political context for outer space and space technology has two main components: a long-standing East-West rivalry that goes back to the beginning of the space age, and a more recent set of North-South disagreements over proposals for restructuring relations between developed and developing countries.

In April 1958, President Eisenhower sent a special message to Congress proposing a civilian space agency, which would ". . . emphasize the concern of our Nation that Outer Space be devoted to Peaceful and Scientific purposes." After extensive hearings in which the importance of international cooperation was stressed, the Congress passed the National Aeronautics and Space (NAS) Act of 1958. The act opened with the congressional declaration that ". . . it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." The act also provided that U.S. space activites were to be conducted so as to contribute to "cooperation by the United States with other nations and groups of nations in work done pursuant to this act and in the application thereof."

When Congress passed the Communications Satellite (COMSAT) Act of 1962, the United States declared its intent to provide a global communications satellite system to be established "in conjunction and in cooperation with other countries," paying care to "providing such services to economically less developed countries as well as those more highly developed."

At the U.N., the United States played a key role in the formation in 1958 of the Committee on the Peaceful Uses of Outer Space. Several international treaties and protocols on the use of space have come out of the committee's work. Perhaps the most significant of these, the 1967 Outer Space Treaty, contains language that reflects the sentiments found in the NAS Act and the COMSAT Act. Article I of this treaty declares, in part, that:

> The exploration and use of outer space . . . shall be carried out for the benefit and in the interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

In recent times, however, the United States has come under intensifying criticism from develop-

ing countries for some of its activities in space. The criticism stems from changes both within the United States and in the international community. In the United States, emphasis has shifted from using space for "all mankind" to exploiting its special properties for the United States in particular. In the international community, the developing world has coalesced into a political bloc capable of opposing the will of the industrialized countries.

The space age began amidst an ideological struggle between the United States and the Soviet Union in which both parties sought to use this new technology to exemplify the superiority of their individual political systems. Each of the superpowers had a strong interest in demonstrating that the value of their accomplishments would accrue not only to themselves, but to the whole of mankind. Consequently, the "space dialogue" which developed during the late 1950's and early 1960's did not emphasize the value of space industries to the economic welfare of individual nations, nor did it emphasize the military value of space. Instead, it was the potential for space to solve large scale global problems that was most often cited to the world community.

It was while nations were viewing space with this "global perspective" that institutions within the United Nations, such as the Committee on the Peaceful Uses of Outer Space, were formed. The United States and the Soviet Union encouraged the nations of the world to aid in planning for the future exploitation of space. However, the United States and the Soviet Union no longer control access to space. Although both space technology and the political context in which space activities are undertaken have altered substantially since the inception of the space age, the idea that all nations have the right to participate in forumulating principles to govern the exploration and utilization of space has never altered.

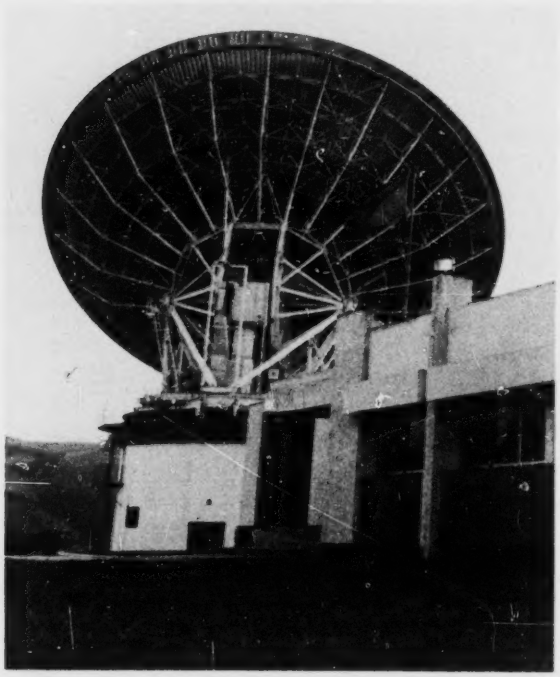
As COPUOS and other U.N. organizations were formulating principles to govern space activities, the United States was building a large and diverse space industry to support defense and civilian needs. Although these two activities originated and grew at the same time, their sometimes antagonistic ideological bases are difficult to reconcile: COPUOS and other international organizations focussed on ideological goals such as establishing an "international regime for outer space." By contrast, the U.S. private sector centered primarily on developing technologies to meet specific communication, meteorological, and resource management needs.

The dominant political division over the use and acquisition of space technology is between the industrialized and the developing countries. In general, the developing countries seek to gain greater access to and control over the resources of outer space and the advanced space technologies of the industrialized nations. They do this primarily by advocating legal and regulatory regimes for space activities in international organizations, where developing countries outnumber and can outvote industrialized countries. The developing countries also promote multilaterally funded and controlled bodies to transfer know-how and technology to the developing world. Industrialized countries, on the other hand, fear turning over too much control to mulitlateral organizations.

An excellent example of effective use of an international cooperative mechanism is INTELSAT. Although INTELSAT is a multinational corporation owned by the participating states, it is highly successful in balancing private and state interests. COMSAT, the designated participating U.S. entity is a legislatively created private U.S. company; it was the initial manager of INTELSAT. The INTELSAT organization functions profitably and provides high quality international communications services. Voting power in INTELSAT is a function of each member state's use of the system,[8] and the major users are interested in maintaining a profitable, efficient organization. This voting regime makes it difficult for the numerically superior minority members of INTELSAT to abuse the function of the organization by raising larger political and economic issues.*

Third world proposals in space affairs often draw on broader agendas that have gained wide-

[8]INTELSAT Agreement, article V.
*The United States currently has a 25 percent vote.



INTELSAT station located in Rabat

spread support from developing countries during the past decade. These include:

**The New International Economic Order (NIEO).**—The idea of NIEO emerged at the U.N. in 1974, when the General Assembly approved the Charter of Economic Rights and Duties of States. Championed by the developing nations (loosely organized into the so-called "Group of 77" (G-77) (see table 2),* the Charter was premised on the idea that economic relations between developed and developing countries were inequitable and should be fundamentally altered. Global economic restructuring would transfer wealth, expertise, and political power from the "haves" (the industrialized West or "North") to the "have-nots" (the less-developed countries or "South"). The negotiations over the Law of the Sea Treaty exemplified this thrust by the developing world.

At the U.N. and elsewhere the G-77 has largely succeeded in setting the terms of the debate on North-South relations, putting the North on the moral defensive and legitimating demands for the transfer of wealth and power to the South. An important consequence of the promotion of NIEO has been the politicization of economic discussions: the developing countries claim a right to an equal share of the world's economic and technological pie; the North responds that any assistance is not a matter of right or of compensation for past injustice. Much of the South's effort has gone towards restricting the activities of foreign private corporations in developing countries: New Economic Order positions favor state control of internal economic affairs and direct state-to-state agreements that give political authorities greater control over international trade. There is a marked preference also for comprehensive multilateral transfer programs rather than the more traditional bilateral aid projects.

Though largely successful in dissociating themselves from the West, the Soviets have on occasion been lumped together with the North; therefore they sometimes (usually as tacitly as possible) side with the West in opposing transfer proposals. China, on the other hand, initially stood aloof from the nonaligned movement and the New Economic Order, but in recent years has associated itself increasingly with the South.

Neither the North nor the South maintain unanimity on all issues. Though the G-77 has been particularly successful in articulating common positions and organizing bloc votes, for particular issues it is often split along political, regional, and economic lines. Agreement on general issues does not always carry over to specific proposals. Within the West, disagreements are more frequent, with voting en bloc a rarity. The United States and other countries with a strong preference for a relatively unrestricted private sector are occasionally at odds with those western countries that favor state-oriented programs and are more sympathetic with the South.

*The Group of 77 (G-77) was not a new organization in 1974. Created by 77 developing countries in the early 1960's to coordinate their position at UNCTAD, G-77 was evolved into the principal negotiating body for developing countries in the North-South dialogue. As figure 4 shows, virtually every developing country is a member of G-77. Although G-77 is often confused with the nonaligned movement, the two movements are different. While the membership of the two groups overlap, G-77 includes countries aligned with East or Western blocs; and where the nonaligned movement addresses political, military and economic issues, G-77 focuses its attention predominantly on economic issues.

**Table 2.—The Members of the "Group of 77," Fall 1980[a]**

| | | |
|---|---|---|
| 1. *Afghanistan* | 42. *Guatemala* | 83. *Peru* |
| 2. *Algeria* | 43. *Guinea* | 84. *Philippines* |
| 3. Angola | 44. Guinea-Bissau | 85. Qatar |
| 4. *Argentina* | 45. Guyana | 86. *Republic of Korea* |
| 5. Bahamas | 46. *Haiti* | 87. Romania |
| 6. Bahrain | 47. *Honduras* | 88. *Rwanda* |
| 7. Bangladesh | 48. *India* | 89. Saint Lucia |
| 8. Barbados | 49. *Indonesia* | 90. Samoa |
| 9. *Benin* | 50. *Iran* | 91. Sao Tome and Principe |
| 10. Bhutan | 51. *Iraq* | 92. *Saudi Arabia* |
| 11. *Bolivia* | 52. Ivory Coast | 93. *Senegal* |
| 12. Botswana | 53. *Jamaica* | 94. Seychelles |
| 13. *Brazil* | 54. *Jordan* | 95. *Sierra Leone* |
| 14. *Burma* | 55. *Kenya* | 96. Singapore |
| 15. *Burundi* | 56. *Kuwait* | 97. Solomon Islands |
| 16. Cape Verde | 57. *Lao People's Democratic Republic* | 98. *Somalia* |
| 17. *Central African Republic* | | 99. *Sri Lanka* |
| 18. *Chad* | 58. *Lebanon* | 100. St. Vincent and the Grenadines |
| 19. *Chile* | 59. *Lesotho* | |
| 20. *Colombia* | 60. *Liberia* | 101. *Sudan* |
| 21. Comoros | 61. *Libyan Arab Jamahiriya* | 102. Suriname |
| 22. *Congo* | 62. *Madagascar* | 103. Swaziland |
| 23. *Costa Rica* | 63. Malawi | 104. *Syrian Arab Republic* |
| 24. Cuba | 64. *Malaysia* | 105. *Thailand* |
| 25. *Cyprus* | 65. Maldives | 106. *Togo* |
| 26. *Democratic Kampuchea* | 66. *Mali* | 107. Tonga |
| 27. Democratic People's Republic of Korea | 67. Malta | 108. *Trinidad and Tobago* |
| | 68. *Mauritania* | 109. *Tunisia* |
| 28. Democratic Yemen | 69. Mauritius | 110. *Uganda* |
| 29. Djibouti | 70. *Mexico* | 111. United Arab Emirates |
| 30. Dominica | 71. *Morocco* | 112. *United Republic of Cameroon* |
| 31. *Dominican Republic* | 72. Mozambique | |
| 32. *Ecuador* | 73. *Nepal* | 113. *United Republic of Tanzania* |
| 33. *Egypt* | 74. *Nicaragua* | |
| 34. *El Salvador* | 75. *Niger* | 114. *Upper Volta* |
| 35. Equatorial Guinea | 76. *Nigeria* | 115. *Uruguay* |
| 36. *Ethiopia* | 77. Oman | 116. *Venezuela* |
| 37. Fiji | 78. *Pakistan* | 117. *Viet Nam*[b] |
| 38. *Gabon* | 79. Palestine Liberation Organization | 118. *Yemen* |
| 39. Gambia | | 119. *Yugoslavia* |
| 40. Ghana | 80. *Panama* | 120. *Zaire* |
| 41. Grenada | 81. Papua New Guinea | 121. Zambia |
| | 82. *Paraguay* | 122. Zimbabwe |

[a]The Group of 77 now numbers 122. The 77 signatories of the 1964 Joint Declaration of the Seventy-Seven are in italics.
[b]Before: Republic of Viet-Nam.

SOURCE: Office of Technology Assessment.

Developing countries have recently begun to place greater emphasis on access to technology, including space technology, asserting that without technical expertise they will be relegated to permanent economic inferiority. The 1979 U.N. Conference on Science and Technology for Development (UNCSTD) helped to crystallize these sentiments: it pointed to the unequal distribution of technology as a primary factor in the dependent position of developing countries and called for a major effort to transfer technology from North to South.

**The New World Information Order (NWIO).**—In many ways similar to the New World Economic Order, the proposals for NWIO stem from assertions by developing countries that: 1) they do not have equal access either to relevant information or to the technologies needed to acquire and disseminate it, and are hence at a disadvantage in economic and political dealings with the North; 2) news coverage of their countries is both sparse and slanted, due to the cultural and political biases of Western reporters; and 3) Western media bring about cultural and economic disrup-

tion in developing countries by raising expectations and popularizing alien perceptions.

New World Information Order proposals generally involve increased state control over what foreign journalists would be allowed to report and over what its own citizens may learn from international broadcasts, wire services, and newspapers. The Soviet Union and other communist countries have enthusiastically supported NWIO proposals. The United States and most Western countries have been strongly opposed to prior restrictions on the flow of information and have invoked the U.N. General Assembly Declaration of Human Rights which guarantees unrestricted access to information.[9]

The *means* of communication are also at issue. On the one hand, developing countries point to their lack of communications infrastructure as a key cause of information inequities. On the other, they see advanced Western technologies, such as communications satellites, as posing an even greater threat to their sovereignty. Hence, while they demand aid in acquiring communication systems, they propose to regulate and restrict its use. This approach is most apparent in UNESCO negotiations over a "Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange." Developing countries have also proposed establishing multinational satellite systems through the U.N. that would give them greater control over and access to advanced technologies. The most authoritative expression of NWIO proposals, the so-called MacBride report,[10] endorses efforts at ITU to allocate geostationary slots on a more equitable basis.

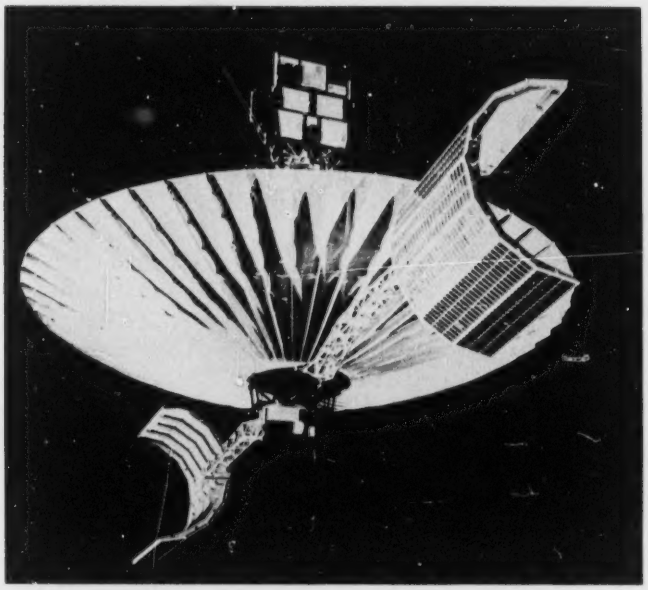
It is important to note that "information" includes not only traditional voice, print, and video but also computer data and satellite remote-sensing imagery. Regulating the international movement of information, in all its forms, would therefore affect not simply political news coverage but also access to resource and financial management data by governments and multinational firms.

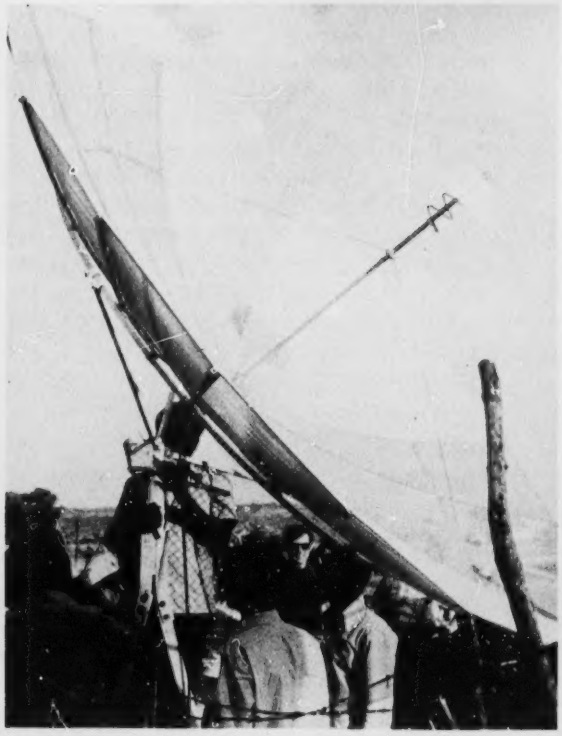
[9]Universal Declaration of Human Rights, U.N. General Assembly Resolution 217 (11) of Dec. 10, 1948, article 19.
[10]*Many Voices, One World,* UNESCO, 1980.

**Common Heritage of Mankind (CHM).**—CHM was first proposed in 1967 by Arvid Pardo of Malta at the U.N. during discussion of the proposed negotiations on the Law of the Sea. Subsequently, it became an integral part of the draft Law of the Sea Treaty as well as the draft Agreement Governing the Activities of States on the Moon and other Celestial Bodies (the so-called "Moon Treaty"), which was negotiated in the Legal Subcommittee of COPUOS during the 1970's.

The CHM concept is generally applied to areas such as the deep sea-bed, and outer space, that are not a sovereign part of any one nation. Such areas have always been understood to be open to transit and exploitation by any nation, without being subject to permanent appropriation. However, under the influence of the New World Economic Order, some developing nations began to press for active jurisdiction over such areas by multinational bodies. In the Law of the Sea negotiations, certain countries advocated a Seabed Authority with power to define the terms under which private companies could mine ocean minerals. The Seabed Authority would be mandated to transfer ocean mining technology and a portion of the revenues from ocean mining to developing countries. In the Moon Treaty, under perhaps a more limited use of CHM, an undefined "international regime" was envisioned to regulate future ventures for exploitating resources on the Moon and other celestial bodies. The nature of this international regime and the extent of its authority were left to subsequent treaty negotiations. In both cases, the proposals were justified on the grounds that the developing countries should share in the exploitation of resources that belonged to all but were accessible only to advanced industrialized countries.

Though the United States initially supported the Common Heritage idea, and is generally credited with bringing about the consensus agreement on its use in the Moon Treaty, it eventually came to oppose both the Law of the Sea and the Moon Treaty. Such opposition was the source of considerable discontent among the G-77 and certain developed countries. The effects, if any, of this opposition, particularly with respect to the Law of the Sea Treaty, are not yet known; none were visible at UNISPACE '82.





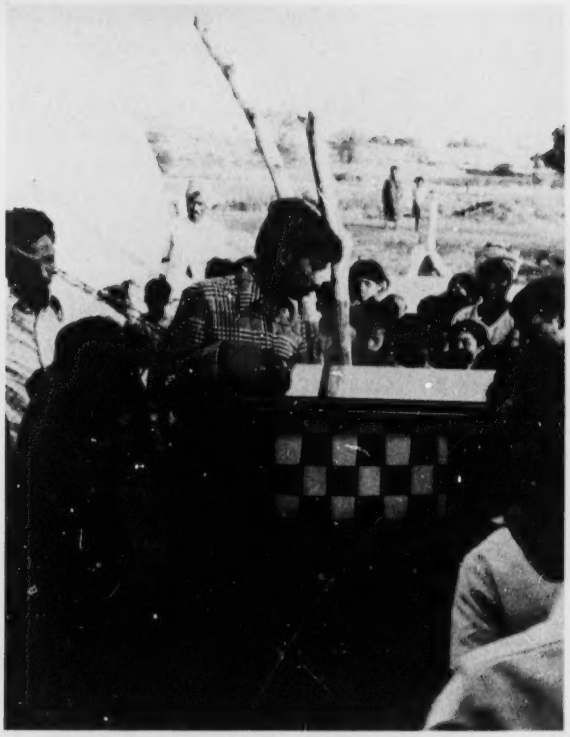


*Photo credits: National Aeronautics and Space Administration*

**Direct receive antenna (lower left) installed in the village of Kerelli (about 300 miles southeast of Bombay, India) utilized in conjunction with the Applications Technology Satellite (ATS-6) (top) permitted TV broadcasting to villages across India (lower right)**

Though not explicitly invoked, the Common Heritage concept has also played an important role in shaping discussions about the allocation of other common resources, particularly the geosynchronous orbit and the electromagnetic spectrum. This fact was apparent at UNISPACE '82.

## MILITARIZATION OF SPACE*

Another important factor of the UNISPACE '82 "environment" is the global concern over the issue of the militarization of Space. The 1967 Outer Space Treaty prohibits weapons of mass destruction (primarily nuclear weapons) in outer space, but until recently there has been relatively little discussion of military space systems. However, in 1981 key members of the G-77, including Brazil, Egypt, India, Nigeria, and Yugoslavia, expressed concern over "the growing dangers of the military uses of outer space."

The sense of danger some states experience has been aroused by the emergence of weapons designed to attack other satellites (antisatellite or A-sats) as well as by the increased use by both the United States and Soviet Union of space systems to support terrestrial military activities. (The Soviet Union possesses a first generation operational A-Sat and the United States has one under development. Neither system, however, is based in space.)

From 1977 to 1979, the United States and the Soviet Union conducted talks on limiting A-sat deployment; the United States broke these off following the Soviet invasion of Afghanistan. At these talks the Soviets professed worry about the possibility of the U.S. space shuttle being used as an A-sat system. In August of 1981, the U.S.S.R. proposed, at the General Assembly, a "Draft Treaty on the Prohibition of the Stationing of Weapons of Any Kind in Outer Space." Article One of the proposed treaty prohibits stationing weapons in space (by implication, direct intercept A-sats launched from the ground without going into orbit would not be prohibited), including on any "reuseable manned space vehicle," i.e., the shuttle. The Soviet proposal was referred not to COPUOS but to the Committee on Disarmament.

In the months preceding UNISPACE '82, a number of U.S. actions and statements strengthened the perception abroad that the United States intends to expand its military space activities. These included:

- the release on July 4, 1982, of a White House Fact Sheet on National Space Policy with strong emphasis on national security programs. The fact sheet announced the formation of a new Senior Interagency Group on Space, chaired by the Assistant to the President for National Security Affairs;
- statements by the Secretary of Defense indicating that the United States is actively considering placing defensive weapons systems in space, along with highly publicized discussions of direct-energy systems in Congress;
- establishment of an Air Force Space Command to coordinate military programs; and
- the flight of a classified Department of Defense payload on the fourth space shuttle mission (landing on July 4, 1982).

The introduction of weapons into space, though not specifically prohibited by international law, raises strong emotions. From the inception of the space age, many have seen space as a "clean slate," an area from which earth-bound political and military rivalries could be excluded. Numerous declarations in U.N. and other fora have extolled the peaceful uses of outer space.

*See app. A for a more detailed treatment of this issue.

Chapter 3

# Origins of the Conference and U.S. Objectives

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# Origins of the Conference and U.S. Objectives

## THE 1968 CONFERENCE

In 1964, members of the Technical Subcommittee of the Committee on Peaceful Uses of Outer Space (COPUOS) proposed a United Nations (U.N.) conference on the Exploration and Peaceful Uses of Outer Space.* Their intent was to inform and educate developing countries about the significance and usefulness of space systems and to encourage use of space technology. COPUOS considered the Subcommittee's proposal that same year and set up a working group composed of its entire membership to examine the desirability of holding such a conference. In 1966, the General Assembly endorsed the working group's proposal.[1] The primary objectives of this conference were to be:

- an examination of the practical benefits to be derived from space research and exploration on the basis of technical and scientific achievements and the extent to which nonspace powers, especially the developing countries, may enjoy these benefits, particularly in terms of education and development; and
- an examination of the opportunities available to nonspace powers for international cooperation in space activities, taking into account the extent to which the U.N. may play a role.[2]

The first U.N. Conference on the Exploration and Peaceful Uses of Outer Space was held in Vienna in August 1968. A. H. Abdel-Ghani, then Chief of the Outer Space Affairs Division, was appointed Executive Secretary and Kurt Waldhiem, then Chairman of COPUOS, served as President of the Conference. The conference was attended by 78 States, nine specialized U.N. agencies and four other international organizations.

Although this conference produced few tangible results, it generated two proposals that were carried out: one to create a U.N. Space Applications Program, which provides technical assistance to developing nations through workshops, seminars, and training, and a second to establish working groups in COPUOS to study such questions as remote sensing, and direct broadcast satellites (DBS).

*Prior to this, the U.S.S.R. had announced that it would propose "the calling of an international conference of scientists under U.N. auspices, on the question of exchange of experience in the study of outer space" General Debate U.N., General Assembly 823 Plenary Meeting, Oct. 6, 1959.

[1]"Report of the Working Group of the Whole," U.N. Committee on the Peaceful Uses of Outer Space, A/AC. 105/30, Jan. 26, 1966.

[2]GAOR/23/AI/24, Report of COPUOS A/7285.

## UNISPACE '82

The rapid progress of space exploration and technology that followed the 1968 conference suggested to some that a second conference was necessary to exchange information and experience, and to assess the adequacy of institutional and cooperative means that were being used to realize the benefits of space technology.[3] Such a conference was suggested to COPUOS by its Scientific and Technical Subcommittee in 1974;[4] in November 1978 the General Assembly agreed to convene a second U.N. Conference on the Exploration and Peaceful Uses of Outer Space.[5]

[3]U.N. General Assembly Resolution 34/67 of Dec. 5, 1979.

[4]Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, A/CONF.101/10, p. 107.

[5]U.N. General Assembly Resolution 33/16 of Nov. 10, 1978.

Between the proposal in 1974 and the General Assembly resolution of 1978, the United States gave no encouragement to those who desired a second conference on outer space. Its reluctance stemmed primarily from doubts about the usefulness of such a conference. In the view of the United States, the 1968 conference had accomplished little; what little it did achieve was not necessarily in best interests of the United States. The establishment of an organization such as the Space Applications Program was contrary to the U.S. policy to conduct its cooperative technology programs largely on a bilateral basis (see app. B for NASA's rationale). The working groups established by the first conference to study such questions as remote sensing and DBS had been unable in the intervening decade to resolve the politically sensitive issues surrounding transborder remote sensing and broadcasting. Further, since then, U.N. sponsored conferences had become increasingly politicized; the United States wished to avoid a confrontation on the basic issues of the New International Economic Order.

Given that the conference would take place, the decision about who would be Secretary General caused little difficulty, as Yash Pal of India, a distinguished physicist and space scientist, was the first choice of many delegations. Selecting the conference venue was somewhat more difficult.

The U.S.S.R. and India both had offered to act as host for the conference. It appeared initially that the conference would be held in Moscow. This would have been politically desirable for the Soviets since 1982 marked the 25th anniversry of the launch of Sputnik. However, such a decision would have contravened a long-accepted understanding that the conference would not be held on the territory of either of the space powers. On the basis of U.S. and other opposition, the Secretary General of the U.N. chose Vienna as a compromise.

The venue established, the United States began to plan its conference participation. By January 1981, an interagency group, including the National Aeronautics and Space Administration (NASA) and headed by the State Department's Bureau of Ocean and International Environment and Scientific Affairs (OES), had completed a draft of the U.S. national paper and had contacted the American Institute of Aeronautics and Astronautics to ensure private sector participation at the conference. Shortly thereafter, a dispute in the U.N. Outer Space Affairs Division caused the United States to halt its preparation for the conference.

The normal procedure for staffing a conference such as UNISPACE '82 is that the Chief of the Outer Space Affairs Division (OSAD) in the U.N. Secretariat becomes the Executive Secretary of the conference. During the preparation for UNISPACE '82 the position of Chief of OSAD had become vacant. An American, Marvin Robinson, who had served in OSAD for 19 years and who had risen to Deputy Chief, was, in the opinion of the United States and others, the most qualified candidate for the position. In the organizational structure of the U.N., OSAD comes under the Department of Political and Security Council Affairs (see fig. 2), headed by a Soviet citizen. Recognizing that the duties of the OSAD Chief would include the function of Executive Secretary of UNISPACE '82, the Soviets proposed Vladimir Kopal, a Czech space lawyer with no OSAD experience, for the vacant position. Despite strong U.S. opposition, the Soviets refused to withdraw their candidate. In response, the U.S. representative to the Scientific and Technical Subcommittee of COPUOS announced that the United States would have to reassess its commitment to the conference.[6]

The State Department and the interagency group working on UNISPACE '82 activities early in 1981 halted most conference preparation in order to stress the seriousness of the U.S. position. Not all concerned U.S. parties agreed with the wisdom of this course of action. On September 21, 1981, members of the House Committee on Science and Technology sent a letter to then Secretary of State Alexander M. Haig, Jr.* urging "an early, positive decision to participate in the sec-

[6]Letter from Richard Fairbanks, Assistant Secretary for Congressional Relations, Department of State, to the Hon. Ronnie G. Flippo, House of Representatives, Oct. 9, 1981.

*The letter was signed by Don Fuqua, Chairman; Larry Winn, Ranking Minority Member; Ronnie G. Flippo, Chairman of the Subcommittee on Space Science and Applications, and Harold C. Hollenbeck, Subcommittee Ranking Minority Member.

ond U.N. Conference on Space."[7] The letter noted that:

> Since the commitment to peaceful exploration and utilization of space represents what we as a Nation stand for, it would be unfortunate if the United States did not fully participate.[8]

In a similar letter sent to James L. Buckley, then Under Secretary for Security Assistance, Science and Technology, the same members expressed the fear that in the absence of U.S. participation, the Soviets might use UNISPACE '82 to the disadvantage of the United States.[9] They referred to the recent attempts by the Soviets to characterize the Space Shuttle as a weapon and noted that:

> To allow such claims to go unanswered by our government in a forum such as UNISPACE '82 would be a mistake.[10]

Since January 1981, the State Department had been trying to achieve a compromise at the U.N. However, the dispute remained unresolved until December 19, 1981, when as his last act as Secretary General of the U.N., Kurt Waldheim appointed Robinson as Acting Chief of the Division to become Chief on the opening day of the conference. Nandasiri Jasentuliana of Sri Lanka was named Executive Secretary of UNISPACE '82. The United States then began to prepare in earnest for UNISPACE '82.

[7]Report on UNISPACE '82, Subcommittee on Space Science and Applications, Committee on Science and Technology, U.S. House of Representatives, July 14, 1982.
[8]Ibid.
[9]Ibid.
[10]Ibid.

## U.S. PREPARATION FOR THE CONFERENCE

### The Preparatory Meetings

Ostensibly, UNISPACE '82 was to be a scientific and technical meeting to discuss the practical uses of space technology, especially in developing countries. The United States had early expressed its hope that controversial political issues would be kept off the agenda.

The standard U.N. practice in preparing for conferences of the size and scope of UNISPACE '82 is to write a draft report before the actual conference so that consensus can be reached on as many issues as possible. The draft report for UNISPACE '82, submitted to COPUOS by the UNISPACE '82 Secretariat in January 1982, was a 116 page document containing 428 paragraphs. The original version of the draft report strongly reflected the personal and national views of its principal author, Yash Pal of India, and seemed to the United States to be unduly responsive to the political agenda of the Group of 77.

The United States took advantage of its opportunities to modify the draft report both at the COPUOS UNISPACE '82 Advisory Committee meeting in January 1982, and the March-April '82 COPUOS meeting. On the surface, the nations who participated in these preparatory meetings accomplished a great deal in agreeing to all but 15 of the 428 paragraphs of the draft report. Paragraphs for which consensus was not possible, along with suggested alternatives, were included in the final draft in brackets. This apparent success was somewhat deceptive since some of the changes in wording tended to "paper over" real issues for the sake of arriving at consensus. In most instances, the unresolved issues became the source of considerable controversy at UNISPACE '82.

### Congressional Interest

The issue of "militarization" of space and questions about the future of the U.S. civilian space program and the role of the private sector in outer space created congressional interest in UNISPACE '82. Of primary importance were the congressional perceptions that:[11]

- The hiatus in U.S. UNISPACE '82 seemed to have prevented the thorough planning preparation necessary for effective conference participation.
- In the "eleventh hour" the United States was still insisting that this was a purely technical

[11]Report on UNISPACE '82, op. cit.

conference and therefore it would not be prepared to discuss political matters.

- Insufficient attempts were being made by the United States to diffuse the political issues that had arisen in the preparatory meetings.
- The full list of delegates would be decided too late to prepare the delegates sufficiently for the relatively complex political issues that were sure to arise in Vienna.
- The attitude of those in charge of conference preparation was that there was little to gain by U.S. participation and much to lose.
- Sufficient consideration had not been given to the private sector's role at UNISPACE '82; in particular, preparations for the U.S. exhibit were late in getting underway.

Both the Subcommittee on Space Science and Applications of the House Committee on Science and Technology and the Subcommittee on International Operations of the House Foreign Affairs Committee held UNISPACE '82 hearings on July 14, 1982 and August 5, 1982, respectively. At these hearings James Beggs, Administrator of NASA, who was serving as Head of the U.S. Delegation with the rank of Ambassador, and Ambassador Gerald Helman, the special coordinator for UNISPACE '82, addressed some of the congressional concerns. Members used these hearings as an opportunity to make suggestions about conference preparations.

In their prepared statement and responses to the Members' questions, Beggs and Ambassador Helman expressed guarded optimism. The hearings disclosed that although the boycott had made conference preparation difficult, the United States would be prepared to participate fully at UNISPACE '82. Beggs stated that the delegation would be ready to discuss political issues and that there would be a strong private sector presence on the delegation and at the U.S. exhibit. In a joint statement, Beggs and Ambassador Helman declared that the administration viewed the conference as an opportunity for the United States to reaffirm its commitment to international cooperation and to emphasize our role as the world leader in space.

It was clear from testimony given by others that the UNISPACE '82 preparatory activities had not been as extensive as those for other international conferences. Ambassador Jean Wilkowski, coordinator for the U.S. delegation to the 1979 U.N. Conference on Science, Technology, and Development, testifying at the July 14 hearing, stated that U.S. preparation for previous international conferences had benefited considerably from the close involvement of outside advisors (eg., Congress, citizens advisory groups, key persons in industry, universities, and foundations) and from thorough analytical studies. This had not been done as extensively for UNISPACE '82.

During the July 14, 1982 hearings, several Congressmen expressed misgivings about the fact that, with only a few weeks left before the conference, the full delegation had not yet been named. By the hearings on August 5, less than a week before the conference was to convene, the delegation had been named, but the list was not yet available to the Congress. The delay in naming the nongovernmental delegates, generally attributed to indecision on the part of the Executive, resulted in there being only one briefing of the delegation before departing for Vienna. The delegation, when named, was composed of a variety of well-informed and experienced representatives from numerous government agencies, Congress, and the private sector. (For the delegation list see app. F).

Chapter 4

# The Issues Negotiated

Chapter 4

# The Issues Negotiated

Most of the controversial political issues related to space technology at UNISPACE '82 have existed since the beginning of the space age and have changed little since first raised in the United Nations (U.N.) Committee on Peaceful Uses of Outer Space (COPUOS). However, in the intervening years, the technology has matured and prospered, and the number of nations having access to or relying on space technology has increased dramatically. Accordingly, the political context of the debate over the exploitation of outer space has changed. The developing world is now more active in space and demands a greater voice in how it is used. Although UNISPACE '82 yielded few surprises or new approaches to the politics of outer space, the conference and its report to the U.N. General Assembly reflect a consensus of states' opinion on the exploitation of outer space.

## MILITARIZATION OF OUTER SPACE

Although not included in the formal conference agenda, worries about the introduction of weapons into space (see ch. 2 and app. A) made the militarization of outer space the most contentious issue at UNISPACE '82. Even during the preparatory meeting of COPUOS in March and April, the paragraphs in the initial draft report dealing with militarization were the subject of intense debate. The initial draft report referred to militarization as "a barrier to greater cooperation and a potential obstacle to deriving the full benefits of space technology," and as an impending "dark shadow over the peaceful and beneficial uses of space."[1] The United States objected to such wording on three grounds:

1. that COPUOS and UNISPACE '82 were not the proper forum for this issue, which had already been referred by Committee I of the U.N. to the Disarmament Committee;
2. that the discussion—and the term "militarization"—did not distinguish adequately between military support systems such as surveillance, communications, or navigation satellites, and space weapons; and
3. that in any case the military uses of space need not interfere with peaceful uses or with the use of space systems by developing countries.

No consensus was reached on these paragraphs at the March COPUOS meetings.

It was clear from the initial plenary session that the militarization of outer space would have to be addressed at the conference. With the exception of the United States and three other countries, all participating nations mentioned this issue in their introductory statements. Early in the conference, Austria proposed that the four paragraphs dealing with militarization might be resolved by assigning them to a special working group. The United States and the Soviet Union both opposed this suggestion. The United States believed that highlighting the issue of militarization at the beginning of the conference would make it more difficult to resolve. The U.S. delegation did express its willingness to participate in an informal working group if all the contested paragraphs were included.

The management of the militarization issue by the leaders of the U.S. delegation was the source of some confusion for many delegations. The United States attended the conference

> . . . prepared to accommodate a limited, preferably single, appropriately stated reference to the problem of weapons systems in space or aggressive uses of outer space contrary to the U.N. Charter.[2]

[1] "Draft Report of the Conference," Preparatory Committee for the Second U.N. Conference on the Explorations and Peaceful Uses of Outer Space, A/CONF. 101/PC/L. 20; Mar. 1, 1982.

[2] Letter from Addison E. Richmond, Jr., Bureau of Oceans and International Environmental and Scientific Affairs to Dr. Gordon Law, Office of Technology Assessment, Dec. 21, 1982.

However, the failure of the United States to raise this issue in its opening speech to the Plenary created the impression in the minds of some delegates that the United States did not oppose the "militarization" of space. This impression was intensified when the representative of the United States, upon having been asked to propose wording on the subject of militarization that was acceptable to the U.S. delegation, stated that the problem was conceptual in nature and it would therefore serve no useful purpose for the United States to put forward proposals on the issue.[3]

Early in the second week, when it became apparent that consensus would not be reached on the paragraphs dealing with militarization, the president of the conference Willibald Pahr (Minister for Foreign Affairs, Austria) assembled a small ad hoc group of "Friends of the President." This device has been used successfully at previous U.N. conferences to resolve complicated issues. The United States agreed to participate actively; as a result, the Friends of the President drafted alternate paragraphs to replace the contested ones (see app. G).

Although the three paragraphs written by the Friends of the President were adopted without debate in the final plenary session, the debate over militarization of outer space was not yet resolved. Before the formation of the Friends of the President, the Group of 77 (G-77) had circulated a position paper calling for a ban on the "testing, stationing, and deployment of any weapons in space." During that final plenary session, Mexico moved to include this document as well as another one concerning remote sensing and direct broadcast satellites (DBS) as annexes to the report (see app. H and I). The United States objected on the grounds that since the conference report, including the paragraphs drafted by the Friends of the President, had been agreed to by consensus it was inappropriate to attach an annex that lacked the consent of all participants. This debate was settled by adding a paragraph in the report that referred to the G-77 document but did not include it as an annex.

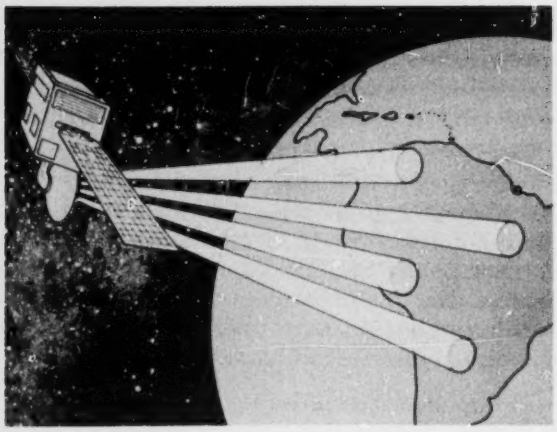
The United States had no easy or obvious course to follow in dealing with the "militarization" issue at UNISPACE '82. That the issue was not on the agenda as called for in the U.N. resolutions establishing the conference was, strictly speaking, correct. It was also true that lengthy discussion of the issue would not resolve it, and could distract the conference from more practical issues on the agenda. Although the United States has an interest in combating Soviet assertions that the space shuttle is a "weapon" while Soviet A-sat systems are not, it is virtually impossible to make this case without agreeing that "weapons in space," once properly defined, are bad. The United States cannot agree that weapons in space are incompatible with "peaceful uses of space" while declining to negotiate on the prohibition or limitation of those weapons. The general U.S. policy, that armaments are a deplorable necessity, but that we seek appropriate and verifiable agreements to limit or reduce them, could be put to good use in situations such as the UNISPACE '82 debate if the United States had a policy on arms control in space. Unless the United States formulates a position on further arms control measures for space, resistance to discussing the issue whenever possible may be the only "damage-limiting" strategy available to the United States (see app. A).

[3]U.N. Press Release OS/V/42, Aug. 17, 1982.

## DIRECT BROADCASTING BY SATELLITE

DBS constitutes both a threat and a promise to developing countries. It is a threat because it provides the potential to allow foreign countries and private broadcasters to transmit programs directly to individuals, bypassing nationally controlled distribution systems. The use of DBS also has considerable promise since it would allow countries to transmit educational, health, and other information services internally without building expensive ground-based infrastructures.

Many developing countries (strongly supported by the Soviets) want international restrictions and regulations placed on the originator of direct



Direct broadcast satellite conceptual illustration

broadcast services that spill over national boundaries. The United States opposes any restrictions on this technology on the grounds that they would be contrary to the concept of free flow of information as embodied in Article 19 of the Universal Declaration of Human Rights, adopted by the U.N. General Assembly in 1948.*

The disagreements on DBS are not simply North-South or even East-West conflicts. Within the developed West, both Canada and Mexico have expressed anxieties over the potential adverse cultural affects of U.S. television programs that will become available with new U.S. systems. The legal subcommittee of COPUOS has discussed DBS and the issue of prior consent for many years and failed to reach agreement on several draft resolutions that would establish principles governing the use of this technology. Before UNISPACE '82, the DBS debate at COPUOS had reached an impasse.

The final conference report raises the issue of prior consent to broadcast by stating that DBS "could affect the sovereign rights of States"[4] and that it is "time for countries to agree on the legal implications . . . of satellites for international direct television broadcasting".[5] A position paper by the G-77 and submitted by Mexico went a step further in its discussion of this issue; it states:*

> The Group of 77 firmly hold the view that activities in the field of international direct television broadcasting through satellites should only be conducted in full respect for the sovereignty of states. In this regard the recognition by the international community of principles embodying: a) broadcasting state's responsibility, b) prior consultation and agreement between broadcasting and receiving states, and c) the radio regulations of the ITU, inter alia, are of utmost importance.

Given the strong feelings that DBS engenders, the DBS debate at UNISPACE '82 was remarkably restrained. However, this issue was the source of considerable controversy at the meeting of the U.N. Special Political Committee Meeting in November 1982. This issue is discussed in detail in chaper 5.

*This declaration states: "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through media and regardless of frontiers." U.N. General Assembly Resolution 217 (111), Dec. 10, 1948.

[4]Report on the Second U.N. Conference on the Peaceful Uses of Outer Space, A/CONF. 101/10, August 1982, par. 308.

[5]Ibid., par. 309.

*As discussed above, this position paper is not part of the final draft report but is mentioned in the report as a separate conference document.

## REMOTE SENSING

Since the first use of military remote-sensing satellites by the United States and Soviet Union in the early 1960's, some states have raised questions about the right of a country to acquire images of other countries, and the further right to disseminate such data to third parties. The United States and the Soviet Union eventually agreed not to object to satellite reconaissance, provided information was not publicized or shared with other than close allies. However, when the U.S. civilian Landsat system began operation in 1972, some states questioned the propriety of distributing data about their mineral and other natural resources to third parties. The U.S. policy of broad inter-

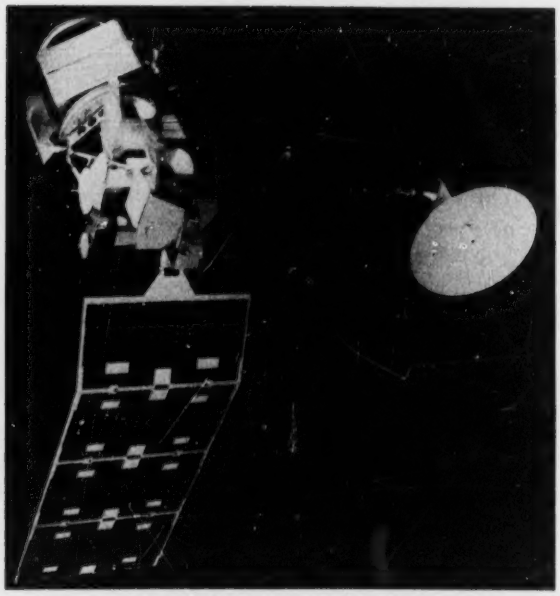


*Photo credit: National Aeronautics and Space Administration*

Landsat-D used for exploring the Earth from more than 400 miles distant

national dissemination gives all parties equal access to information. In addition, through the Agency for International Development, the United States has provided developing countries with assistance in the application of Landsat data for national purposes.

Today, because many of these countries now use Landsat data (80 m ground resolution) on a daily operational basis, and because a new high-resolution, commercially oriented system (the French SPOT) will be flown in 1984, questions about resolution limits, prior consent, pricing policies, and data distribution have taken on new meaning. SPOT is designed to provide ground image resolutions down to 10 m. The experimental thematic mapper on Landsat 4 provides ground resolution of 30 m or better. Such systems can not only yield information regarding natural resources but also data on some military items. Some countries favor restrictions on the ground resolution of civilian satellite sensors; others support a legal regime that would require obtaining the permission ("prior consent") of sensed countries before acquiring data or selling them publicly, especially if this is done before the data are available to the sensed country. These countries argue that nations have sovereignty not only over their natural resources, but also over information about these resources.

The United States has repeatedly rejected prior consent rules and limiting ground resolution on the premise that any regime which controls resource information is incompatible with the U.N. doctrine of the free flow of international information. The United States favors the most open possible regime both for obtaining and disseminating remotely sensed data.

The political difficulties associated with remote sensing were not raised in the draft conference report. Instead, the draft report emphasized the economic implications of remote sensing, and called attention to: 1) the need for continued access to data from remote-sensing systems and, 2) the importance of efficiently coordinating existing and new systems for use by developing countries.[6] Paragraph 172 of the draft report (par. 174 of the final report) had said:

> . . . A possible situation in which data is not available to the sensed State but is available for commercial and other forms of exploitation by another country has been a cause of concern to a number of countries. It is therefore important to reach agreement on principles governing satellite remote sensing.

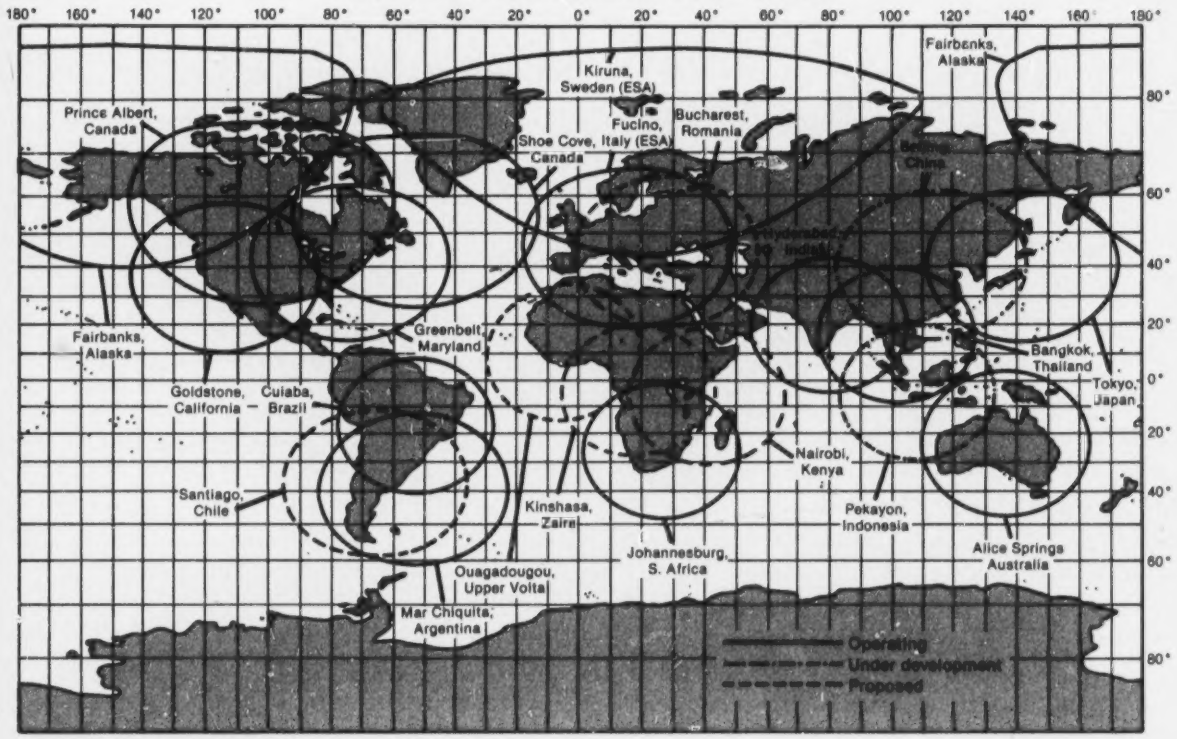
In the final report of the conference (par. 174) the wording was altered to say:

> A possible situation in which data are not available to the sensed State but are available for commercial and other forms of exploitation by another country has been a cause for concern to a number of countries. The sensed State shall have timely and non-discriminatory access under reasonable conditions to the primary data obtained by remote sensing from outer space which relate to its territory. It is therefore important to reach agreement on principles governing satellite remote sensing. Accordingly, the current discussions on this in COPUOS should be completed expeditiously.

This amended paragraph, by recommending "timely and nondiscriminatory access [to data]

[6] "Draft Report of the Conference," A/CONF. 101/3, Apr. 20, 1982.

**Current and Probable Landsat Ground Stations**




NOTE: Coverage circles based on Landsat-3 reception (altitude: 917 km)
SOURCE: National Aeronautics and Space Administration.

under reasonable conditions," cautiously addresses the fears of the developing countries that prior access to data by industrialized nations will result in loss of control of their own resources. Still, it fails to address the matter of prior consent to distribute data by the sensed states. A more radical approach to the issue of prior consent was taken in the position paper submitted by Mexico on behalf of the G-77.*

> The Group of 77 firmly holds the view that activities in the field of remote sensing should be carried out with full respect for the sovereign rights of states. The Group of 77 believes that sensed States should have timely and unhindered access on a priority basis at nominal cost, to all data and information obtained over their territories. Dissemination of such data and information derived from it to a third party should not be done without the prior consent of the sensed country. The Group of 77 urges UNISPACE '82 to recommend, through the General Assembly, to the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee to finalize the work on the elaboration of draft principles concerning remote sensing of the earth from space as a matter of high priority.

Although both statements accept implicitly the right of the sensing states to acquire data from satellites, the crucial issue they touch on is data dissemination to third parties. The difficulties that might result from demands for prior consent to distribute remote sensing data are discussed in chapter 5.

*See app. H.



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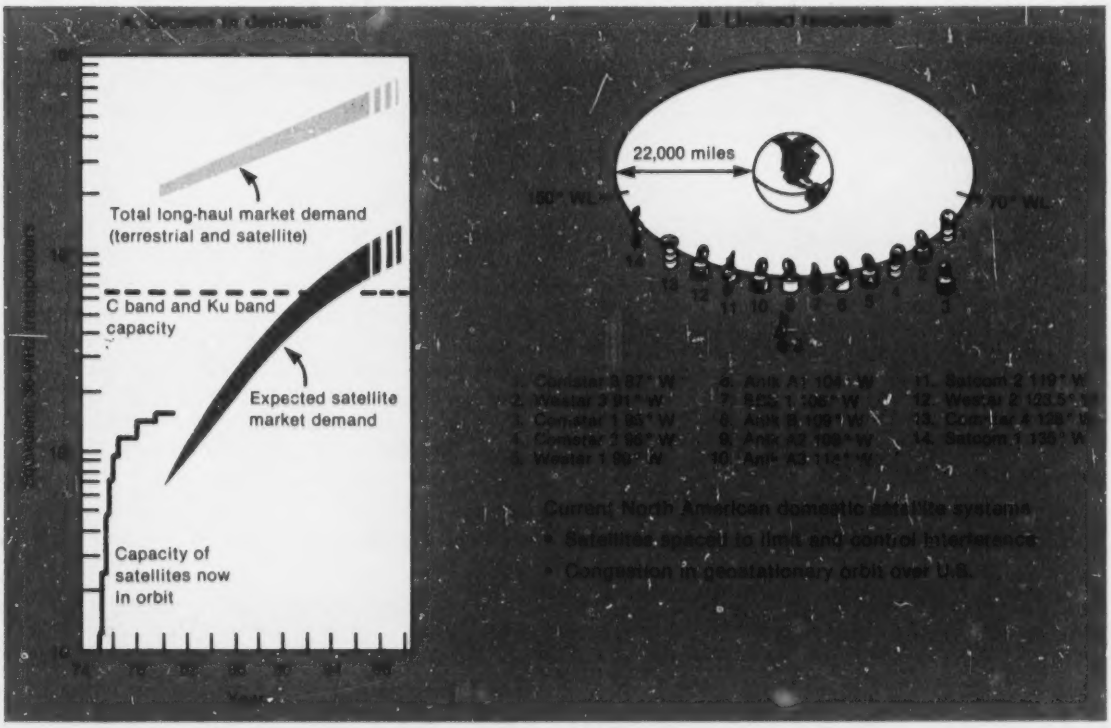
## GEOSTATIONARY ORBIT

Of all the possible orbits satellites can take around the Earth, the geostationary orbit (GSO) is both most useful and most restricted. This orbit is a narrow band in the equatorial plane of the Earth 35,800 km above its surface. Because objects in the GSO remain fixed with respect to points on the Earth's surface, almost all present and projected civilian communications satellites and some meteorlogical satellites are located there. In recent years, certain portions of the geostationary arc have become congested electromagnetically. Physical congestion of the GSO also looms as a possibility; the probability of collisions between working GSO satellites, whose positions are highly controlled, and uncontrolled obsolete satellites grows each year. Use of the GSO has given rise to two separate disputes.

### Allocation of Orbital Slots and Frequencies

The administrative responsibility for preventing electromagnetic interference in space now rests with the International and Telecommunications Union (ITU). The ITU registers and assigns satellite frequencies and orbital position requests on a first-come first-served basis; any country or organization that desires to place a satellite in orbit can do so, provided it does not interfere with other satellites. This manner of allocation and assignment is supported by the United States and other industrialized states, who argue that it permits the most efficient use of orbital and frequency resources. However, many developing states object that a "first-come first-served" policy may

**The Communications Problem**




SOURCE: National Aeronautics and Space Administration.

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result in the GSO and certain frequencies being "used up" by industrialized countries before developing countries and regions can determine their own needs. These states argue for "equitable and/or guaranteed access" to ensure that these limited resources will be available to them when needed.

Claims of the developing nations to "equitable access" resulted in Resolution No. Spa 2-1, adopted by the 1971 WARC (and included in the Final Acts of WARC-79):

> That the registration with the ITU of frequency assignments for space radio communication services and their use should not provide permanent priority for any individual country or groups of countries and should not create an obstacle to the establishment of space systems by other countries.

This 1971 position was reinforced at the ITU's Malaga-Torremolinos Plenipotentiary Conference in 1973 that amended the ITU Convention to include article 33, which reads:

> In using frequency bands for space radio services members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of the radio regulations according to their needs and the technical facilities at their disposal.

The U.S. position is that technical advances can continue to expand the usable frequency spectrum and number of GSO slots sufficiently to satisfy the world's communication needs. New technology to reduce current orbital spacing and arc configuration will provide for a greater number of satellites, and recent technological advances in the use of higher frequencies (14/12 GHz and eventually 30/20 GHz) will meet the frequency requirements of all potential users.

The United States and other Western states oppose a priori allocation of slots or frequencies, and they view any comprehensive plan for geostationary allocation as restrictive and inflexible. They fear that prior restrictions may also impede technical development of communications systems.

In discussions of the UNISPACE '82 draft report, the United States argued for language emphasizing the potential of new technologies. Some nations objected on the grounds that while new technologies could expand the GSO's potential, they would also be more expensive, both for the space and ground segments, than current technology.* The United States then supported wording giving the ITU the responsibility for evolving "criteria for the most equitable and efficient usage of the GSO and the RF spectrum" to ensure that this issue would be reconciled in a forum more capable of discussing its technical merits.**

In a controversial paragraph (par. 150), the draft report stated:

> . . . it seems desirable that developed countries shift their satellite communication system to a different frequency band (e.g., 11/14 GHz), leaving the 6/4 GHz band basically for use by developing countries. Developed countries should also be encouraged to shift their high-density and transoceanic traffic to submarine cable or fibre-optic systems, thereby decreasing the pressure on the radio frequency spectrum and on the GSO.

Because of the disruptive effect that such a change would have on domestic and international communications, the United States and other developed countries were prepared to oppose this paragraph vigorously. The paragraph was deleted from the final conference report with little debate, suggesting that though the developing world is concerned with political access to the GSO there is little agreement as to what, if any, technological solutions may be in their best interest.

## Ownership of the GSO

The importance of the GSO, the unsettled status of the longstanding dispute in COPUOS as to where outer space begins, and the desire of certain developing countries to exert greater leverage in the international system have led to a contro-

*In article 281 of the draft report the United States suggested the inclusion of the sentence: "Further, the newer technologies that lead to better utilization (e.g., better station-keeping, higher frequencies, shaped antenna beams, etc.) should be adopted in so far as possible by all countries and international organizations." This sentence appears in the final report in this fashion: "It is desirable for all users of the geostationary orbit to keep in view the advantages of adopting, wherever practicable, newer technologies which could in practice facilitate more effective use of the geostationary orbit."

**Paragraph 284 of the draft report of January 1982 had stated that such criteria should be developed "with the help of ITU;" this was changed to "within the ITU."

versy over the ownership of the GSO. In 1976, seven equatorial states, including Colombia, Ecuador, and Indonesia, issued the Bogota Declaration, which claimed sovereignty over the portion of the geostationary arc above their respective territories in spite of the fact that the 1967 Outer Space Treaty explicitly rejects sovereign claims to outer space. The Bogota signatories argued that the GSO was not in fact part of outer space but a distinct region determined by the Earth's gravitational pull. Support for this position by other developing countries has been mixed, partly because ownership by any one nation contradicts the desire of many developing countries for "equitable and/or guaranteed access" to the GSO. However, the equatorial countries obtained the backing of G-77 for a position paper which declares that "the present regulatory mechanism for assigning orbit positions and radio spectrum does not ensure equitable access to this resource . . ."and that a new regulatory mechanism is necessary which will take into account "the particular needs of the developing countries including those of the equatorial countries . . ."* The final conference report mentions the claims of the equatorial countries without supporting them.**

*See app. I.

**Paragraph 281 of the final report states:" Despite lack of agreement on defining the precise boundary between air space and outer space, it is accepted by most nations that GSO is a part of outer space and, as such, it is available for use by all States, in accordance with the Outer Space Treaty of 1967. However, the equatorial countries consider that GSO constitutes a physical phenomenon related to the reality of our planet in that its existence depends exclusively on its relation to gravitational phenomena generated by the earth, and for this reason it should not be included in the concept of outer space and its utilization should be regulated under a sui generis regime."

## TRANSFER OF TECHNOLOGY AND THE ROLE OF THE U.N. IN SPACE AFFAIRS

If there was a single underlying theme to UNISPACE '82 it was the transfer of space technology from developed to developing nations. Developing countries see the U.N. as the preferred agent of deliberation and execution for most activities related to the New International Economic Order and the New World Information Order. By contrast, many developed countries, including the United States, see the U.N. as cumbersome and politicized, and therefore inappropriate for carrying out many technology transfer programs.

The basic justification for increased access to space technology and services is that it promotes development. The final report cites many specific examples to support this view. It raises the issue first in paragraph 8 by invoking the example of the 1979 U.N. Conference on Science and Technology for Development (UNCSTD), whose conclusions are characterized as "in general, applicable to the field of space science and technology."[7] It then cites specifics from the UNCSTD report. UNCSTD was a multinational conference similar to UNISPACE '82 that dealt with the entire range of technical issues. That conference was noteworthy for its numerous attacks on developed countries for monopolizing science and technology. The developing countries demanded large-scale transfers of technical hardware and know-how to the developing world.

Among the UNCSTD conclusions quoted approvingly in the final UNISPACE '82 report are assertions that eliminating underdevelopment "presupposes an equitable distribution and creation of scientific and technological capabilities of the world."[8] The report extends these arguments in paragraph 11, where it says that:

> Space technology can be a powerful tool to accelerate national development: it provides a way of leap-frogging over obsolete technologies and getting away from percolation and trickle-down models of development for which developing countries do not have the time . . . It is therefore necessary that all countries be able to have access to space technology.

At the March COPUOS meeting, some developed countries objected both to the assignment

[7]Report on the Second U.N. Conference on the Peaceful Uses of Outer Space, op. cit., subpar. 8, ref. 2.

[8]Ibid.

of guilt (and the implied duty to make redress) for the uneven distribution of space technology and to the exaggerated claims made for the ability of space technology to foster development. They suggested wording to the effect that:

> Space technology is by no means the complete solution to a country's problems neither can there be any generalized prescriptions for the use of space technology.

This wording appears in paragraph 12 of the final report.

During the preparations for UNISPACE '82, numerous new and expanded responsibilities for the U.N. itself were debated. In the original version of the draft report (before the March meetings of COPUOS), these coalesced into a proposal to establish a U.N. Centre for Outer Space Affairs, which would conduct research, provide technical assistance to developing countries, and disseminate space-related information. The Centre was to be independent of (and in large part would supplant) activities of the U.N. Outer Space Affairs Division and to have its own staff and budget, both substantially larger than under present arrangements.

This proposal ran into considerable opposition from several quarters. Within the U.N. bureaucracy, some officials saw the center as encroaching on activities already performed by a number of independent U.N. agencies, e.g., the World Meteorological Organization, U.N. Development Programme, and the U.N. Centre for Science and Technology. Many countries, including the United States, while not opposing the concept of the Centre, objected to the added expense. The Soviet Union, given its dominant position in the Secretariat of the Committee on Political and Security Council Affairs which oversees the Outer Space Affairs Division, opposed any diminution of the powers of OSAD.

As a consequence, the second draft emphasized firmly coordinating activities with other appropriate U.N. agencies but did not recommend establishing the new Centre. The final report represents a compromise: it requests the General Assembly to consider whether it would be best to establish a center or to expand the present OSAD. In adopting the conference report in December, 1982, the General Assembly attempted to do both. It established an International Space Information Service to provide direction to existing data banks and information sources.[9] This is a much diluted version of the original concept of the center. The General Assembly also requested the Secretary General to strengthen OSAD.

[9] U.N. Doc. A/SPC/37/L.7; par. 8.

Chapter 5

# UNISPACE '82 in Perspective

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UNISPACE '82 is unlikely to have a significant effect, either positive or negative, on the long-term space goals of the United States. The chief product of UNISPACE '82, the conference report, which has since been endorsed by the United Nations (U.N.) General Assembly, reflects a limited consensus among the industrialized and developing countries. Because the U.S. approach to UNISPACE '82 was neither a stunning success nor a dismal failure the conference may seem unimportant.* It is useful, however, to view such conferences, and U.S. participation in them, not as discrete phenomena focused on one set of technological issues, but rather as episodes in a continuing series of discussions involving the structure of international economics and politics. Attitudes and policies created at a conference such as UNISPACE '82 affect the debate on similar issues in other fora such as the International Telecommunication Union (ITU) or the U.N. Special Political Committee. The interplay of ideas among multilateral conferences can have a cumulative effect which could work to the net disadvantage of the United States. The direct broadcast satellite (DBS) resolution passed in the U.N. General Assembly in December 1982 (discussed in ch. 4) is one example of this problem.

In several respects UNISPACE '82 was typical of other conferences dealing primarily with developing country issues. In it, the Group of 77 (G-77) demonstrated their ability to overcome national differences and present a united face to the "North." Some G-77 countries criticized the United States (primarily for the militarization of space), denounced Israel (primarily for the invasion of Lebanon) and demanded new legal principles and strengthened international organizations. Nevertheless, UNISPACE '82 does offer an opportunity to review the development of international space policy, the role that the United States and its various agencies play in this process, and the potential effect of this process on public and private U.S. interests.

*One reviewer of OTA's efforts to evaluate UNISPACE '82 had this to say: "I believe that (UNISPACE '82) is not an important question. It seems to me that Congress hardly needs to be reminded that early involvement, selection of a statured and "permanent" leader and staff, etc., is necessary to perform at our best at such convocations. Moreover, I expect, if the facts were really known, the U.S. results were neither a raving success nor a dismal failure. . . . I seriously doubt that there was any permanent damage from what did or did not transpire at UNISPACE. Some of the countries' arguments are just not changeable; in other areas it is not all that important what other countries think and do. Moreover, there will be recurring forums where the U.S. position can be expanded. Some of those forums will undoubtedly be more important than UNISPACE-Vienna." For a different viewpoint, see app. D.

## INTERNATIONAL SPACE POLICY AND THE U.N.

The G-77 will continue their strategy of using global conferences of this sort to encourage changes in global resource allocation and technology transfer. The acquisition of space technology, because of the prestige it conveys and its potential to assist in development, will continue to be a valuable political target for the G-77. The United States, in order to protect its political and economic relationships with both the "South" and its OECD partners, as well as to ensure technical coordination of certain critical space systems (e.g., frequency allocation at ITU), will have little choice but to participate in such conferences. They present an opportunity not only to shape accommodations with developing country demands, but also to gain specific diplomatic and commercial advantages vis-a-vis our competitors.[1] Some of the typical complications inherent in effective participation in global conferences emerged at UNISPACE '82.

**U.S. international space policy depends directly on domestic space policy.**—It would be advantageous if the U.S. delegates could attend global conferences with a set of clear policies regarding

[1]See generally, *A Handbook for U.S. Participation in Multilateral Diplomacy: The U.S. and U.N. Global Conferences;* prepared for the Department of State by The Futures Group (N. Graham, R. Kauffman, M. Oppenheimer), September 1981.

the entire range of space activities. Such clarity for all cases is impossible in a pluralist society where different administrations and different interest groups significantly affect both the allocation of resources for space technology and how this technology is applied (e.g., by the public or the private sector).

At several points during the conference preparation and at UNISPACE '82, issues arose that might have been resolved to benefit the United States had the delegation been able to present a clear statement of U.S. policy. For example, the first draft of the UNISPACE '82 report called on the United States to ensure the continuity of remote sensing data. Because the future of the Landsat system was (and continues to be) uncertain, at the March/April 1982 meeting of COPUOS this wording was removed at the request of the United States. Nations that have invested substantially in the use of Landsat data or the purchase of ground receiving and processing equipment regard this absence of promised continuity with deep concern. What the United States is willing to accept as the "institutionalized confusion" inherent in a democracy, others regard as yet another sign of U.S. unwillingness to state its international priorities clearly and precisely.

Whether or not a commitment to Landsat continuity would have been in the best interests of the United States is a subject that will be discussed in the full report.[2] In any case, the ability to make such a commitment might have been used as a bargaining chip when addressing developing world demands for a prior consent regime to govern remote sensing. It might have also prevented nations from looking too eagerly to the French SPOT system. Conferences such as UNISPACE '82 offer the United States the opportunity to explain its positions and to inform the world of the many complications of maintaining a broad multidisciplinary space program in a free society.

**G-77 solidarity is both a strength and a weakness for their causes.**—The G-77 demonstrated convincingly at UNISPACE '82 that unity was their strongest weapon. From the beginning of the conference the G-77 met and developed positions that stressed their agreement on the problems of the use of space technology rather than on their disagreements over what was to be done about such problems. However, as one author has pointed out, the costs of preserving this unity are considerable:[3]

> (A)greement is reached by finding grand issues over which there is consensus or by adding together each country's claims and concerns. While this "least common denominator" approach allows for agreement—and unity—it often prevents substantive negotiations with the North. Demagoguery tends to triumph rather than negotiable moderation. The G-77 is inflexible; simply stated, priorities cannot be decided upon, it is difficult to decide what demand to give up, and the negotiations can rarely be moved to the "who gets what and when" stage.

Evidence of the truth of this assertion was in abundance at UNISPACE '82. When developing a position on the use of geosynchronous orbit (GSO), the G-77 included the demands of the equatorial nations, even though many G-77 nations oppose such demands.* Differences of opinion over the need for a U.N. Centre for Outer Space prevented either strong opposition or support for this proposal from the developing world: the proposal as it appears in the report is diluted and ineffective. The idea that the developed countries move their communication services out of the 6/4 GHz band, a radical proposal thought by some to have potentially great benefits for G-77 countries, vanished from the report with little debate. Indeed, most of the recommendations and proposals for studies that do appear in the conference report would, if instituted, give relatively little assistance to the developing countries.

The apparent unity of the G-77 on some issues may sometimes make it seem that the best the United States can hope for is to "limit the damage" to U.S. interests in international conferences. For example, the United States knew well before UNISPACE '82 that G-77 countries were likely to present a nearly united front on the GSO, on DBS, and on remote sensing. It was also clear that these countries would raise the question of "militarization" of space.

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[2] *International Cooperation and Competition in Civilian Space Activities*, OTA report, in preparation.

[3] *A Handbook for U.S. Participation in Multilateral Diplomacy*, op. cit., p.26.

*Discussed in ch. 2.

Because the G-77 consitute a relatively tenuous coalition, consensus on any given issue may be superficial and may allow more room for maneuver than is readily apparent. On the "militarization" issue, for example, the United States was not, as some expected, saddled with unilateral responsibility for the "arms race in space," assailed for developing the space shuttle for use as a "weapon," or condemned for all its military space activities. What did irritate many delegations, in and out of the G-77, was U.S. unwillingness—until the last possible moment—to acknowledge that UNISPACE '82 had any right to discuss the "militarization" issue. In retrospect, it appears that the United States might have maintained its basic position that the Committee on Disarmament in Geneva was the proper place for substantive treatment of the militarization of outer space and at the same time have acknowledged the importance of the issue to many UNISPACE '82 delegations. G-77 found an easy "rallying point" in what was widely regarded as U.S. "stonewalling" of the militarization issue. The initial hostility aroused on this point was then exploited by those opposed to the U.S. position on other issues. As a result, the fragile consensus of G-77 was hardened rather than fragmented.

How a U.S. delegation responds to the particular pressures and complications of a given global conference is a matter of tactics and will depend, to some degree, on the personality and experience of the delegation leadership. In the light of the experience with the G-77 on the militarization issue, the decision, made well before the conference, to attempt to "limit the damage" on it at UNISPACE '82 may have been ill-advised.

**The future of consensus decision in international space affairs is in danger.**—This method of decision involves patient and often frustrating negotiations intended to reach results (e.g., a plan of action, a statement of principles, or specific treaty language) agreeable to all participants. COPUOS has used consensus successfully to reach agreement on five international space treaties.[4] No rule of law binds COPUOS to the consensus method; rather, in 1961 the 28 member nations agreed to use consensus, unless agreement was impossible, in which case decisions would be taken by majority vote.[5] More recently, the expansion of COPUOS to 54 nations and the political stalemate between the "North" and "South" over the issues involved in remote sensing, DBS, and GSO, have strained the consensus process.

At UNISPACE '82 two issues nearly came to a vote. The first was the adoption of the rapporteur's summary of a debate on the Middle East; the second was the inclusion of two G-77 position papers in the report.* A vote on these issues was avoided by the last minute plea of the conference president, Willibald Pahr, that the contending parties attempt to reach a compromise. After informal discussion, they struck a compromise and the consensus procedure was saved (see ch. 4). The subjects of the disagreements are perhaps of less importance than the fact that many nations were prepared to abandon consensus decisionmaking in favor of voting. This fact was confirmed at the Special Political Committee meeting of November 1982, which was held, among other reasons, to adopt the 1982 COPUOS report and the UNISPACE '82 report in order to transmit them to the U.N. General Assembly for action.

The Special Political Committee, noting that COPUOS had been unable to reach an agreement on a set of principles to govern DBS and responding to a resolution introduced by a number of developing countries, decided to bring the DBS issue to a vote.[6] The resolution passed by a large majority. Over the protest of the United States, the U.N. General Assembly adopted a set of nonbinding principles governing the use of direct broadcast satellites—principles endorsing the right to "prior consent" of the nations receiving such broadcasts.**

[4]See generally; E. Galloway, "Consensus Decisionmaking by the United Nations Committee on the Peaceful Uses of Outer Space," *Journal of Space Law*, spring, 1979.

[5]Ibid.

*For a summary of the debate on the G-77 position papers, see ch. 4.

[6]A/SPC/37/L.5/Rev.1; Nov. 19, 1982. Preparation of an International Convention on Principles Governing the Use by States of Artifical Earth Satellites for Direct Television Broadcasting (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Egypt, India, Indonesia, Iraq, Kenya, Mexico, Niger, Nigeria, Peru, Philippines, Romania, Uruguay, and Venezuela: revised draft resolution).

**The relevant section reads:

*Consultations and agreements between States*

A State which intends to establish or authorize the establishment of an international direct television broadcasting satellite service shall

(continued on p. 52)

Since these DBS principles are nonbinding, their precise wording is less important than the trend that they foster, viz., a willingness to bring political pressure to bear on the "North," even at the expense of the consensus process. It is now likely that majority voting will be used to resolve other difficult space issues. Consequently, the United States can expect to face demands, backed by the threat of a vote, to change its position on prior consent for remote sensing and equitable access to the GSO.

It is essential that the United States make the best use of its diplomatic and technical resources. Conferences such as UNISPACE '82 offer one means by which to accomplish this goal. Clearly articulated positions, well thought-out proposals, and creative diplomacy can do much to encourage the idea that, at least in space, other nations would do best to work with the United States rather than against it.

(cont'd)

without delay notify the proposed receiving State or States of such intention and shall promptly enter into consultation with any of those States which so requests.

An international direct television broadcasting satellite service shall only be established after the conditions set forth in paragraph 1 above have been met and on the basis of agreements and/or arrangements in conformity with the relevant instruments of the International Telecommunication Union and in accordance with these principles.

With respect to the unavoidable overspill of the radiation of the satellite signal, the relevant instruments of the International Telecommunication Union shall be exclusively applicable.

## THE USE OF INITIATIVES AT UNISPACE '82

In order to reaffirm the U.S. commitment to international cooperation in space, the U.S. delegation proposed seven mulitlateral projects at UNISPACE '82:

- **Global Habitability.** An international cooperative research effort to obtain data on changes of the environment that would affect the habitability of the Earth.
- **Communication Satellite Technology Seminar.** A 2-week seminar for representatives from developing countries designed to promote the practical application of space communication technology.
- **Study on Development of International Emergency Disaster Assistance Communication System.** A study to be undertaken by the Outer Space Affairs Division in consultation with interested international organizations.
- **Conference on Disaster Monitoring and Early Warning.** A 5-day conference given by the U.S. Agency for International Development (AID) on using space technology for early warning of disasters such as flood, drought and famine.
- **Landsat Data Indexes.** Compilation of a set of indexes and related maps designed to encourage the use of Landsat data collected over the years.
- **Policy of Satellite Removal.** Recognizes value of policy of removing, when practical and feasible, satellites from GSO when their useful lifetimes are complete.
- **Annual Meeting of Space Technology Experts.** An annual 2-day meeting of representatives of government agencies responsible for space and space-related activities to be held just before the annual meeting of the Scientific and Technical Subcommittee of COPUOS.

Consistent with the leadership that the United States has always shown in international space affairs, the United States was the only country to present specific proposals for international cooperation at UNISPACE '82. However, because of the constrained preparation time and the lack of funds to implement long-term, expensive projects, it was difficult to reap the maximum political advantage from these proposals.

The proposals were presented by James Beggs, the head of the U.S. delegation, in his opening speech, and explicated at special "poster sessions" held during the conference. Because of the packed conference schedule and the fact that the room in which the poster sessions were held was a considerable distance from the formal meeting halls, attendance at the poster sessions was meager. This was partly because the U.S. delegation was un-

able, because of time constraints, to make known its needs for meeting rooms well in advance of the conference. However, when the United States did make its request known, the UNISPACE '82 secretariat initially refused, and later only reluctantly agreed to assist the delegation.

Given the limitations of the facilities assigned by the Secretariat, the U.S. delegation might yet have used the poster sessions more effectively had the proposals been better integrated into the entire U.S. effort. It might have been politically desirable for the United States to seek joint sponsors for its proposals or at least to involve other countries in a debate on their merits during the course of the conference. This tactic would be less important for proposals, such as the Landsat Indexes or the Removal of Satellites from Orbit, which are unilateral in nature and made to demonstrate a cooperative spirit rather than to attract cooperation on a specific project. However, for projects such as the Global Habitability Study, which require international collaboration to be successful and for which the United States was not prepared to supply the funds, early and active participation by OECD and developing countries would seem essential.

## FOREIGN POLICY AND THE NASA/STATE DEPARTMENT RELATIONSHIP

UNISPACE '82 provided an example of how the National Aeronautics and Space Administration (NASA) and the State Department coordinate their differing activities in the context of a global conference. Prior to UNISPACE '82, NASA and the State Department jointly developed conference positions and proposals. During the conference, although the Administrator of NASA was head of the U.S. delegation, the State Department was primarily responsible for articulating and defending U.S. positions. NASA, in addition to assisting the State Department in their efforts, also concerned itself with meeting other nations to plan for future international cooperative agreements.*

The ability to use space technology to accomplish diplomatic ends is a complex task. International space policy in the United States has evolved over the years, changing in response to both technology and the global political environment. The major actors in this process have been the President, NASA, the Congress, the State Department, the National Security Council, the domestic user community (including government agencies), and the private sector. Although all of these actors have contributed significantly, the great bulk of the task of putting international space policy into practice has fallen to NASA.*

In 1958, President Eisenhower recognized that it would not be in the interest of the United States if all of NASA's international arrangements had to be in the form of treaties subject to the advice and consent of the Senate. Therefore, when signing the National Aeronautics and Space Act he cautioned that the act did not preclude "less formal arrangements for cooperation."[7] It is through these "less formal arrangements" that NASA has conducted the majority of its international ventures.

The fact that NASA conducts its own international activities does complicate the use of space technology in the conduct of foreign policy. NASA's role as a research and development or-

*After UNISPACE '82, NASA representatives stated that they conducted over 30 separate bilateral meetings during the conference.

*Section 205 of the NAS Act states: "The (NASA) Administration, under the foreign policy guidance of the President, may engage in a program of international cooperation in work done pursuant to this Act, and in the peaceful application of the results thereof, pursuant to agreements made by the President with the advice and consent of the Senate."

[7]White House Press Release, July 29, 1958. See also Statements by Presidents of the United States on International Cooperation in Space. Chronology: October 1957-August 1971, prepared by Eugene M. Emme, Director, NASA Historical Staff; Senate Committee on Aeronautical and Space Sciences, Senate Document No. 92-40, 92d Cong., 1st sess., Sept. 24, 1971, pp. 13-14.

ganization compels it to seek partners with which it can accomplish technological goals (see app. B). The State Department, the foreign policy organ of the American Government, pursues international relationships that accomplish political and diplomatic tasks. Because the State Department lacks the technical expertise to deal with space technology it has traditionally deferred to NASA's judgment on most international space activities.

Examining the nature of the NASA/State Department relationship in light of its contribution to the implementation of U.S. foreign policy raises a number of questions. What degree of control should the State Department exercise over NASA's international activities? Should access to NASA expertise and cooperation be used to attract support for U.S. positions on space affairs? Should the State Department be allowed to use space technology to bargain for international support on nonspace related issues? Would "politicizing" NASA work to the net advantage or disadvantage of the United States?

Examining these questions in full is beyond the scope of this report. They will be discussed in OTA's, forthcoming assessment, International Cooperation and Competition in Civilian Space Activities.

## ROLE OF THE PRIVATE SECTOR

Although most space activities have been previously sponsored or controlled by the Government, the U.S. private sector has played a major role in developing space technology and building space systems, especially for satellite communications. In addition to supplying the necessary satellite hardware, it pioneered creative management techniques to ensure efficient global communications. In the mid-1980's additional services will be available through direct broadcast satellites owned and operated by the private sector. Private corporations are now exploring the possibility of providing remote sensing, weather, and space transportation services. By the end of this century the private sector could be the major civilian actor in space.

In the United States, the government has consistently encouraged the involvement of private enterprise in its space programs.[8] In fact, the United States is nearly unique in the world in its separation of the Government and private sector. Because the role of private industry varies within each of the nations of the world, and because governments and not private industry enter into international space agreements, it is important that the U.S. Government work diligently to protect U.S. private interests in space. This is particularly important because the foreign customers of space technology are likely to be governments.

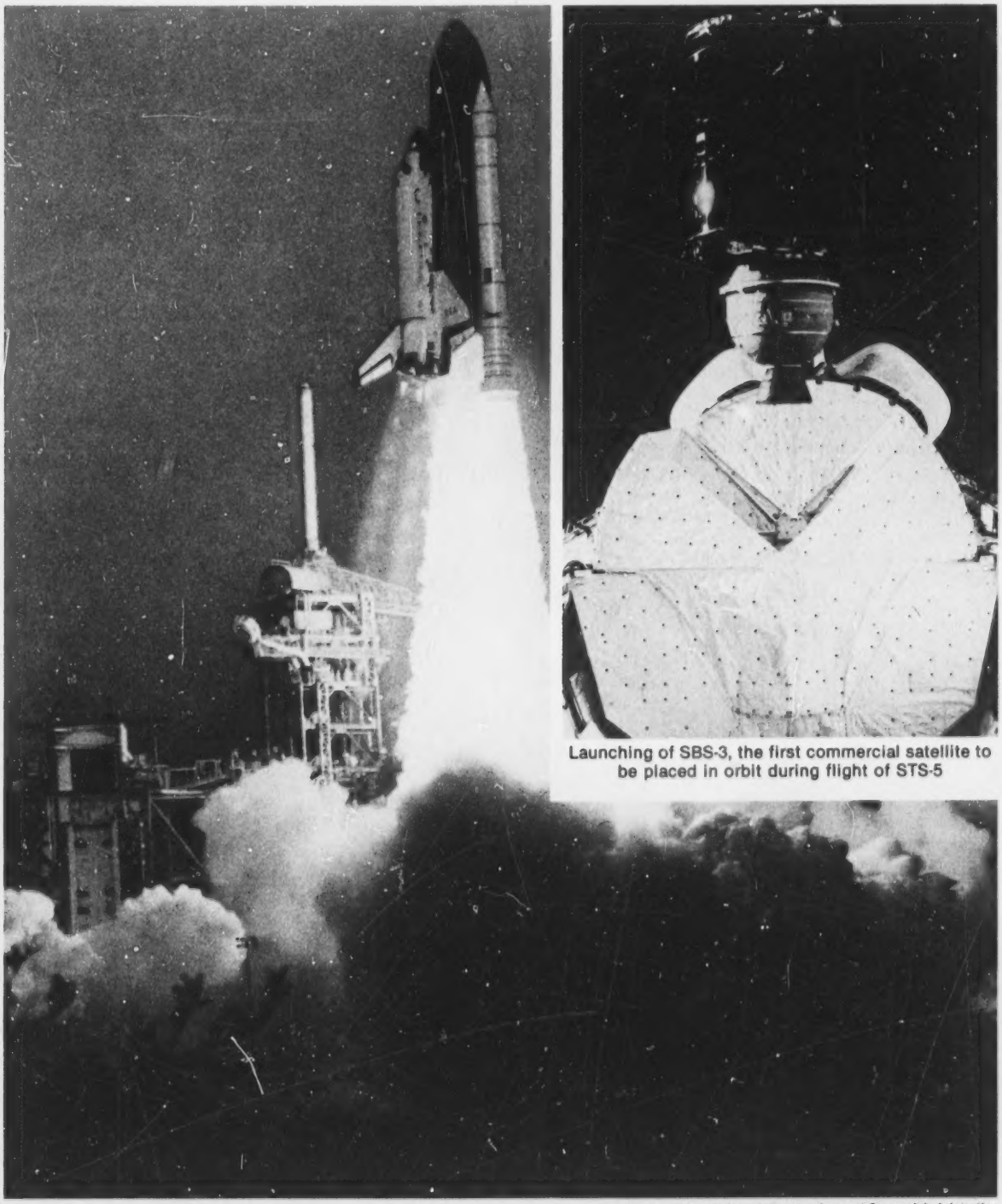
Photo credit: COMSAT

INTELSAT station utilized by COMSAT in American Samoa

UNISPACE '82 demonstrated that although coordination between the Government and U.S. industry is difficult, the private sector can be an extremely valuable resource in U.S. participation at global conferences. U.S. industry contributed members and advisors to the delegation, and exhibits of U.S. space technology.

The participants from the private sector were able to assist the delegation by offering inde-

[8] *Civilian Space Policy and Applications* (Washington, D.C.: U.S. Congress, Office of Technology Assessment, June 1982), OTA-STI-177.



Launching of SBS-3, the first commercial satellite to be placed in orbit during flight of STS-5

*Photo credits: National Aeronautics and Space Administration*

Space shuttle Columbia (STS-5) blasting off with Astronauts Allen, Lenoir, Overmyer, and Brand

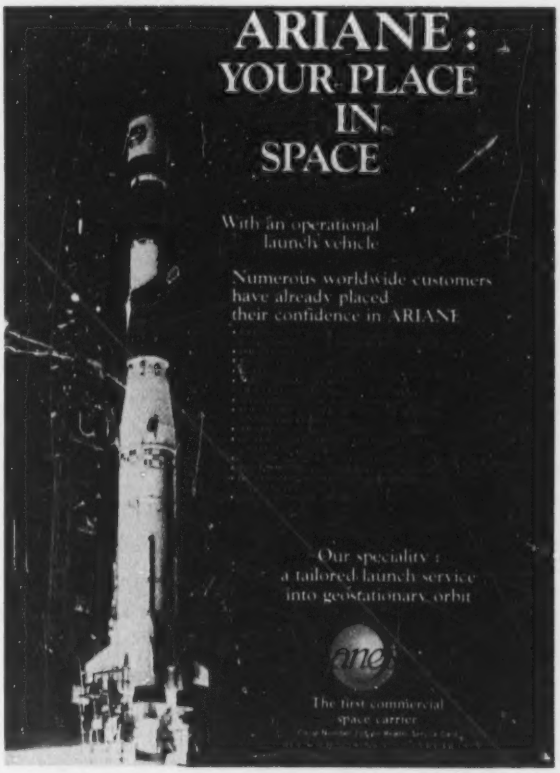
pendent assessments of how events at the conference might affect U.S. commercial interests or domestic politics. Aside from their advisory role, these participants also engaged in informal discussions that allowed them to gather information from potential customers.

In addition to the formal conference activities, UNISPACE '82 sponsored an exhibit of national space programs. Uncertainty over whether the United States would attend UNISPACE '82 hindered U.S. preparations for the exhibit. Once the decision was made to attend the conference, Vice President George Bush met personally with several U.S. aerospace chief executives, urged them to attend UNISPACE '82, and assured them of Federal help. The Government financed the redesign of the exhibit hall in Vienna and provided transportation of the exhibits to Vienna. This close cooperation between the Government and the private sector resulted in an impressive and informative U.S. exhibit at UNISPACE '82.

Delays in the U.S. commitment to attend UNISPACE '82 and in naming the delegation caused some difficulty in making the most effective use of the private sector. Some private sector participants at UNISPACE '82 reported after the conference that they felt underused or that they were given little direction at the conference. This complaint was not unique to UNISPACE '82. A recent report prepared for the Department of State noted:[9]

> Precisely defining (the role of the private sector members of a delegation) is a problem area which has frequently plagued U.S. participation in multilateral diplomacy. Unfortunately, the resulting dissatisfaction among non-governmental members has tended to negate the potential benefits that were expected to accrue by naming them to the delegation in the first place. Their utility as advisors on various issues before the conference is minimized, and they are unlikely to be interested in playing a facilitating, public relations or lobbying role during the postconference implementation phase. Much potential good will and support is often lost.

[9] *A Handbook for U.S. Participation in Multilateral Diplomacy*, op. cit., pg. 119.




Advertisement from *AW&ST*, May 1982

Private sector advisors, with their valuable technical, organizational, and negotiating skills, can assist delegations at similiar conferences by working out innovative positions and by gathering international support for these positions. A more creative use of the private sector might also assist many delegates from the developing world to understand the critical role that the U.S. private sector has played in the growth of technology. This will be particularly important in future conferences on outer space as the U.S. private sector begins to move into the ownership and management of remote sensing, DBS, space-manufacturing, and space transportation systems.

The difficulty of integrating the private sector into the U.S. delegation demonstrates the necessity of spending enough time and effort preparing private sector participants. For example, one private sector adviser at UNISPACE '82 was informed on his arrival in Vienna that he was

responsible for interacting with delegates from several African nations. The adviser received no directions regarding the purpose of his "interactions" or the issues that might be of special concern to the African delegates.

The role the private sector plays in the development of long-term U.S. space policy is also of crucial importance. On this subject a 1976 State Department report stated:[10]

> Traditionally and factually, U.S. industry and U.S. Government have operated in a less-than-fully-cooperative manner. An atmosphere of suspicion as to motives on either side makes for arm's length relationships. . . . It is eminently appropriate that the Department of State recognize that, as the central repository for competence in dealing with U.S. relations with the rest of the nations of the world and with the principal responsibility for doing so, it must develop a productive relationship with the private sector which will permit and encourage the employment of appropriate technologies in support of U.S. diplomatic initiatives. And, indeed, it would be even more useful if the Department could involve appropriate representatives of the private sector in certain aspects of its own planning where industrial technology is to be involved.
>
> An alert and well staffed OES (Bureau of Oceans and International Environmental and Scientific Affairs) should be continuously active in developing an understanding of the interests, general and specific, of individual industrial companies and of specific segments of industry in overseas activities. In effect, a loose partnership of interests—governmental and industrial—should be fostered. This will require that OES recruit a small number of professionals with a strong desire to play a creative role in reestablishing and further extending the preeminence of the United States in most areas of technology. These should be persons with broad experience in industry or public policy deliberations.

As the number and type of private sector space activities increase it may be appropriate to form an industrial advisory group with expertise in specific space technologies. Such an advisory group could aid in conference participation, but, more important, it could be a useful means to conduct long-term policy formation and analysis.

[10]T. K. Glennan, "Technology and Foreign Affairs, a Report to Deputy Secretary of State Charles W. Robinson," December 1976, p.33.

# Appendixes

Appendix A

# The "Militarization" Issue at UNISPACE '82

## Historical Context

In formal speeches at the UNISPACE '82 Conference, the Secretary General of the United Nations (U.N.) and most of the national delegations attending expressed concern about the "militarization" of outer space. But precisely what constitutes militarization of outer space has long been a matter of debate. In January 1957, before the first Sputnik went up, the United States had proposed at the U.N. that an international inspection system be set up to assure that:

> . . . future developments in outer space would be devoted exclusively to peaceful and scientific purposes . . .[1]

In 1958, the Soviet Union proposed:

> A ban on the use of cosmic space for military purposes and an undertaking by the States to launch rockets into cosmic space only under an agreed international program.

In voting for the U.N. resolution setting up an ad hoc Committee on the Peaceful Uses of Outer Space, the United States recognized:

> . . . the common aim that outer space should be used for peaceful purposes only.

The National Aeronautics and Space Act of 1958 begins with a declaration that:

> . . . it is the policy of the United States that activities in space should be devoted to peaceful proposes for the benefit of all mankind.

The Soviets in this early period identified "peaceful" with "nonmilitary."[2] The United States, on the other hand, interpreted "peaceful" as "nonaggressive." Military activities in space would therefore be permissible as long as they did not involve aggression.

Neither of these definitions proved very helpful in banning specific activities from space. On the one hand, nearly every overtly civilian space activity can have military applications: communications, weather observation, remote imaging, geodetics, and navigation services can all be used directly or indirectly for military purposes. Even had it been technically feasible, to open up national space systems to intense international scrutiny and regulation to assure the absence of military application would have been too much for either the United States or the Soviet Union to accept.

On the other hand, once it is admitted that banning all military activity from space is impractical, where is the line drawn between "aggressive" and "nonaggressive"? Until 1963, the Soviet Union insisted that reconnaissance satellites were illegal violations of national sovereignty, and ought to be banned. From the U.S. point of view, reconnaissance satellites helped maintain peace by providing warning of any preparations for surprise attack; from the Soviet point of view, reconnaissance satellites could make a surprise attack easier by pinpointing the attacker's targets. With the 1972 treaty limiting antiballistic missile systems, the Soviet Union and the United States agreed that reconnaissance satellites—one of the "National Technical Means of Verification"—were legitimate and that, indeed, it would be a violation of the treaty to interfere with their monitoring of treaty compliance.[3]

The United States and the Soviet Union did agree in 1963 to a U.N. resolution in which they stated their intentions not to station in outer space any objects carrying nuclear weapons or other kinds of weapons of "mass destruction." This resolution formed the basis for article IV of the Outer Space Treaty of 1967 which formalized the agreement.

The parties to that treaty recognized:

> . . . the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes.

But it did *not* prohibit the use of space for *other* than "peaceful" purposes. In fact, it provides only that:

> The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden.

By implication then, the latter activities (except for the testing of weapons of mass destruction, banned by the 1963 limited nuclear test ban treaty) are *not* forbidden elsewhere in outer space.

## Recent Context

### Antisatellite Weapons

Although the United States and the Soviet Union have agreed to keep weapons of mass destruction out

[1] U.N. document A/C.1/783, Jan. 14, 1957, General Assembly official records, 11th sess., agenda item 22, p. 6.

[2] Cf. Robert L. Bridge, "International Law and Military Activities in Outer Space," *Akron Law Review*, vol. 13, No. 4, p. 658. This interpretation would have banned long-range ballistic missiles, which pass through space on their way to target. The Soviets coupled their call for the nonmilitarization of space with a demand for the withdrawal of all forces from foreign bases.

[3] On the early Soviet and U.S. positions on reconnaissance satellites, cf. Gerald Martin Steinberg, *The Legitimation of Reconnaissance Satellites: An Example of Informal Arms Control Negotiation*, doctoral dissertation, Cornell University, 1981.

of Earth orbit, they have by no means agreed to keep weapons out of space. Ballistic missiles, when tested, pass into and out of space, as they would if actually armed with nuclear weapons. Between 1967 and 1971, the Soviet Union tested a weapon which appeared to some to be inconsistent with the spirit of the Outer Space Treaty: a fractional orbital bombardment system, or FOBS. Instead of following a ballistic trajectory, the FOBS rockets went into partial orbit, which would have allowed them to avoid the northern radars of the U.S. Ballistic Missile Early Warning Line.*

In the last two decades both sides have tested weapons intended for use in space. Antiballistic missile systems would operate in space (ABM's *based* in space, however, would be constrained by the 1972 ABM treaty). In fact, U.S. research and development ABM's based at Kwajalein Island in the South Pacific were tested and had some operational capability as antisatellite weapons. In 1964, the United States declared operational a nuclear-armed antisatellite rocket based on Johnston Island, southwest of Hawaii. The system was dismantled in 1975.

Since 1967, the Soviets have tested an antisatellite weapon about 20 times (according to the trade press).[4] This nonnuclear weapon goes into a partial or full orbit, then approaches the target satellite closely enough to damage it by exploding into a hail of shrapnel. This weapon is based on the ground and launched aboard a large rocket, derived from the old Soviet SS-9 ICBM. The Department of Defense considers the Soviet antisatellite system to be operational.

For its part, the U.S. Air Force has been developing an aircraft-based antisatellite weapon that should be much faster and more flexible than the Soviet system.

## The ASAT Talks

In 1978 and 1979, the United States and the Soviet Union held three sets of talks on the possibility of limiting antisatellite weapons. A fourth session had been informally scheduled for February 1980, but, in the wake of the Soviet invasion of Afghanistan, the Carter administration declined to meet with the Soviets again. In his statement of space policy, President Reagan mentioned that the possibility of arms control in space would continue to be a matter for "study."[5] In September of 1982, the Director of the Arms Control and Disarmament Agency told a Senate Foreign Relations Committee subcommittee that the issue was very complex and difficult, and that the administration had been unable as yet to prepare a negotiating position.[6]

## Soviet Positioning on "Militarization"

The United States, then, has accepted the onus for delaying further talks on the control of antisatellite weapons. In the meanwhile, Soviet propaganda and diplomacy have been working to enhance the international image of the Soviets on the space "militarization" issue while fostering criticism of the United States. In 1981, the Soviets began what one analyst calls "Brezhnev's Peace Offensive."[7]

The Soviets expressed their willingness to participate in a summit conference, to negotiate a Nordic region nuclear free zone, to have a moratorium on new missile deployments in Europe. They have joined the Western allies in negotiations on long-range nuclear weapons in Europe. They have resumed strategic arms limitation talks (renamed START by the Reagan administration) with the United States despite the U.S. failure to ratify the long-negotiated SALT II Treaty.

In August 1981, the Soviets submitted to the U.N. a "Draft treaty on the prohibition of the stationing of weapons of any kind in outer space." In his covering letter to the Secretary-General of the U.N., Soviet Foreign Minister Gromyko pointed out that the existing international agreements on space did not preclude the stationing in space of weapons not covered by the definition of weapons of mass destruction. "Consequently," he wrote, "the danger of the militarization of outer space still exists and has recently been increasing."[8]

Soviet propaganda has made it clear that the Soviet Union places the blame for this increasing danger on the United States. The Soviet position is that the Soviet space program has always been purely peaceful in nature: since 1958, according to Gromyko, the Soviet Union:

> . . . invariably stated and continues to state that space should be a sphere of exclusively peaceful co- operation.

A 1981 commentary by a Soviet writer in the Moscow journal *International Affairs* is typical of

*Some 18 missile silos at a Soviet test site were considered by U.S. intelligence as likely launch pads for the FOBS; most of these silos would have been dismantled had the United States ratified the SALT II Treaty. In any case, given U.S. early warning satellite capabilities, the FOBS would be of little value to a Soviet surprise attack. The U.S. military has never considered a FOBS to be worth developing.

[4]See "Soviet ASAT Test Called 'Carbon Copy' of One Last Year," *Aerospace Daily*, June 22, 1982, p. 283, and "Soviets Launch Second Satellite Intercept in Nine Months," *Aviation Week & Space Technology*, Feb. 9, 1981, pp. 29-30.

[5]"The White House Fact Sheet: National Space Policy" (Washington: Office of the White House Press Secretary, July 4, 1982.)

[6]Testimony of Eugene V. Rostow before a subcommittee of the Senate Foreign Relations Committee, Sept. 20, 1982. U.S. Congress, Senate Committee on Foreign Relations, Subcommittee on Arms Control, Oceans, International Operations and Environment, *Arms Control and the Militarization of Space Hearing*, 97th Cong., 2d sess., Sept. 20, 1982 (Washington, D.C.: U.S. Government Printing Office, 1982), pp. 7-8.

[7]See Joseph G. Whelan, "Brezhnev's Peace Offensive, 1981," Congressional Research Service, report No. 82-96S, May 17, 1982.

[8]U.N. General Assembly, Doc. A/36/192, August 1981.

Soviet propaganda on the militarization of Space. The Soviet Union, said the commentary:

> . . . is doing everything possible to preclude turning outer space into another sphere of military confrontation, a threat posed by the U.S. dangerous plans for an arms buildup in outer space.[9]

Calling the Soviet proposal for banning weapons from orbit: ". . . a logical extension of the U.S.S.R.'s sustained efforts for the total demilitarization of outer space." The Soviet author goes on to give the Soviet Union primary credit for all the arms control agreements concluded between the Soviet Union and the United States. The article accuses the United States of attempting to gain control of space in order to win military superiority. "Following this dangerous course, the American side froze the talks on antisatellite systems it had held with the U.S.S.R. in 1978-79."[10]

Citing speculations in the U.S. press, Soviet propagandists describe the space shuttle as not only a reconnaissance platform and a transport for constructing military space stations, but as a platform for nuclear weapons and laser weapons:

> The Pentagon plans to test the laser "cannon" in outer space in April 1982, during the fourth flight of the Shuttle.[11]

Because the United States made no official comments on the nature of the military payload on STS-4 (which actually took place in June-July 1982), the Soviets were free to feed any sorts of speculation about it.

The Soviets, going into UNISPACE '82, had positioned themselves very well on the "militarization" issue. Their own military space program, which is larger than that of the United States, receives very little publicity. Even when foreign observers acknowledge that the "militarization" of space is two-sided, it is usually a U.S. event—like the flights of the shuttle—which is the immediate cause for discussion. For example, upon the landing of STS-4 and President Reagan's space policy statement, which appeared to give new emphasis to the military side of space policy, the moderate *Tokyo Shimbun* editorialized:

> President Reagan's "national space policy" announcement is a declaration of military expansion in space. We are strongly concerned about the new U.S. policy which encourages the U.S.-Soviet arms race in space . . .[12]

Soviet propagandists have been quick to exploit developments in the United States as indications of the U.S. "militarization" of space: research on the Prototype Miniature Air Launched System (an antisatellite weapon), the refusal of the United States to resume ASAT limitation talks, military participation in the Space Transportation System, the budgetary trend away from the civilian space program and toward the military one, the announcement in June of 1982 that the Air Force would create a Space Command in order to better coordinate military space activities, the national security emphasis in President Reagan's space policy statement.

Only tacitly do the Soviets admit that they have a military space program of their own: while decrying the U.S. program, they warn that they will not permit the United States to win superiority. They caution against ". . . underestimation of the U.S.S.R. scientific and technological potential," which has

> made itself felt more than once in postwar times . . . America's plans are fraught with a serious danger, since their implementation would sharply escalate the arms race, opening up a new area in this field.[13]

Given the general perception of the United States as the world's technological leader—a perception reinforced by the success of the space shuttle—the notion that it is the United States that is leading the arms race into space probably falls on fertile ground.

## Foreign Perceptions of the Arms Race

The American point of view is that the arms race is a burden imposed on the United States by the inordinate military preparations of the Soviet Union. It seems particularly unfair that we should be saddled with criticism for our military uses of space when the Soviet Union launches many more military satellites each year than we do.

From the point of view of many nonallied governments, as well as important segments of the populations of even our allies, however, the fact that the Soviet Union may be just as big a "sinner" as, or bigger than, the United States does not lessen our responsibility. They view the superpower arms race as a whole as an illegitimate activity, one which absorbs resources which might otherwise be contributed to international development and which endangers international security.[14] Those who see the superpower arms race as a dangerous process which the protagonists are doing little to halt are likely to see military developments in space as an integral part of that process.

The U.S. position is that our military space programs operate benignly because they have been largely passive gatherers and transmitters of information. We

[9]V. Basmanov, "For a Weapon-Free Space," *International Affairs* (Moscow), No. 11, 1981, p. 13.

[10]Ibid., p. 101.

[11]Ibid., p. 103.

[12]Quoted in ICA "Morning Digest: Foreign Media Reaction," International Communication Agency, July 6, 1982, p. 3.

[13]Basmanov, op. cit.

[14]This point of view on the arms race underlay the report of the "Palme Commission"—the Independent Commission on Security and Disarmament, which consisted of well-known figures in international affairs. See its *Common Security: A Blueprint for Survival* (New York: Simon & Schuster, 1982).

correctly point out that reconnaissance satellites have, in part, had a stabilizing effect on the strategic nuclear arms race by:

- helping to prevent drastic overestimates of military build-ups by the other side, and
- helping to verify compliance with arms control treaties.

But in the final analysis, military satellites are meant to enhance military power, and those on the sidelines of the superpower competition certainly realize this. For them, the "militarization" of space is just another example of superpower arrogance toward "genuine" world interests. The U.S. Government does not have to accept this perception to recognize that it exists and may need to be dealt with.

U.S. foreign policy in the past 2 years may have fed the perception that the Government has no real interest in controlling the arms race. The Reagan administration is widely seen, accurately or not, as having been forced into negotiations over theater nuclear weapons in Europe by a determined West European antinuclear-weapons movement. It has expressed a fundamental dissatisfaction with a SALT II treaty negotiated over 7 years by a Republican and a Democratic Administration, although it continues to abide by its provisions. The suspicion remains that it still hopes, as promised in its 1980 election platform, to regain a military superiority over the Soviet Union (a theme to which Soviet propaganda gives considerable play).

## UNISPACE '82

### Conference Draft

In 1981, the Committee on the Peaceful Uses of Outer Space reported that several nations had expressed concern over "the growing dangers of the military uses of outer space."[15] The "Draft Report of the Conference" (UNISPACE '82) raised the issue in three separate places. The "militarization" paragraphs were placed in brackets in the draft to indicate that they were not unanimously accepted by the preparatory committee. Nonetheless, it was clear that the issue would be raised by many at the conference.*

[15]1981 Report of COPUOS, 36th sess., supplement No. 20 (A/36/20).

*The "militarization" paragraphs were as follows:

Paragraph 13: A major concern, a barrier to greater co-operation and a potential obstacle to deriving the full benefits of space technology is the increasing militarization of space. Some military activities—e.g., national technical means of verification (surveillance satellites), navigation aids, communications for search and rescue, dissemination of meteorological data, etc.—have continued for many years and some have been used for civilian purposes also. However, the recent introduction and proposed development of aggressive systems in space have cast a dark shadow over the peaceful and beneficial uses of space. In order for the peaceful uses of space to develop in a cooperative, constructive and unhindered manner, it is necessary to forestall and reverse this unfortunate trend towards the increased militarization of space.

### U.S. Position

The U. S. position on the "militarization" issue at UNISPACE '82 was that:

> Questions of arms control and militarization are not on the UNISPACE '82 agenda and it would be disruptive to insist that the conference pay special attention to it.[16]

But the State Department briefing book for the delegation left the U.S. strategy for dealing with the issue at UNISPACE '82 unclear. It recognized that despite U.S. objections, the question *would* come up:

> Nevertheless, we fully expect a number of governments to express to UNISPACE their serious apprehensions. The draft UNISPACE report itself contains a variety of references to the dangers of militarization. The U.S. delegation, thus, may well have to respond to efforts to make the subject one of special concern to the conference.[17]

But it left unclear what "special concern" might mean, and to what extent the United States would oppose discussion or action on the issue.

On the one hand, the delegates were to be prepared to argue that the U.N. Committee on Disarmament was the only proper U.N. forum for the issue and that UNISPACE '82 could contribute "nothing substantive." On the other hand, the delegates were offered counterarguments on the issue itself that:

- "militarization" was a misleading term because international law permits nonaggressive military uses of space;

A more provocative version of this paragraph called the militarization of space a "danger to international peace and security."

Paragraph 205: However, there is another major obstacle to drawing the full benefits form space technology—an obstacle that threatens to grow larger and to make uncertain the prospect of future beneficial applications. Increasing doubts about the inviolability of peaceful space activities will mean a set-back to beneficial applications. Many countries have expressed concern at the dramatic increase in the militarization of space. If space technology is to contribute to man's development as fully as it can, if nations and peoples are not to be denied the fruits of its numerous beneficial applications, this negative trend must be reversed.

Paragraph 419: The increasing militarization of space is a matter that has caused great concern to Member States. While military and disarmament matters are dealt with in other fora of the United Nations, and issues regarding militarization of space have been referred by the General Assembly to the Committee on Disarmament, increasing militarization does directly impinge on peaceful uses of space and on the benefits that nations can derive from space. To this extent, and by the fact that the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies—which banned nuclear weapons or weapons of mass destruction in outer space—was intitiated and formulated in COPUOS, such matters are within the legitimate concern of COPUOS also. It is therefore suggested that COPUOS should examine and refer for consideration of the General Assembly how best it can ensure that outer space is used for solely peaceful purposes.

[16]"UNISPACE 82 Issue Paper: The 'Militarization' of Outer Space," in *U.S. Delegation to the Second United Nations Conference on th Exploration and Peaceful Uses of Outer Space, Vienna—August 9-21, 1982: Briefing Book*, sec. III-C, "Issue Papers."

[17]Ibid.

- the space shuttle is not a weapons system and does not carry weapons into space;*
- U.S. military space systems also provide "vital human services" and help monitor arms control agreements; and
- such systems should not be stigmatized because they function in space.

So the United States was prepared to discuss the issue up to a point, but the State Department did not clearly define what that point was. In the end, the conference arrived at compromise wording for the final "Decisions and Recommendations" which should not raise particular difficulties for the United States. The wording simply acknowledges the international concern about "an arms race in space" (the term "militarization" is avoided) and calls on the General Assembly and the Committee on Disarmament to heed that concern.**

## Discussion: Dilemmas of the Issue

As costly in international good will as U.S. tactics on the "militarization" issue at UNISPACE '82 may have been, they may have been the best "damage-limiting" approach available. The United States had no easy or obvious course to follow in dealing with the question. The argument that the issue was not on the agenda as called for in the U.N. resolutions establishing the conference was, strictly speaking, correct. The argument that lengthy discussion of the issue would not resolve it, but could distract the conference from more practical issues on the agenda, was also valid.

There were also some fears that did not materialize but might have. Would there be a general condemnation of all military activities in space, which would be completely unacceptable to the United States?* Would the Conference degenerate into a tribunal for the denunciation of the U.S. military space program, focussing on alleged uses of the space shuttle as a weapon? Or would the United States, given recent publicity about its military space programs, bear the brunt of the blame for leading an arms race in space?

Finally, if the United States had agreed to compromise on report wording about the military question earlier in the conference, would further compromises, less acceptable to the United States, have been demanded before the conference was over? In other words, would forthcoming discussion of the issue let the camel's nose into the tent? At the same time, other considerations might have dictated that the United States grant the issue at least some legitimacy for discussion at UNISPACE '82. First, even though the militarization of space was not literally on the formal agenda, the relevant "bracketed" paragraphs of the draft conference report were there and would be discussed, whatever the wishes of the United States.

Second, delegations of every stripe—Communist (Chinese as well as Soviet), Third World, neutralist, and U.S.-allied—expressed concern about the potential for an arms race in space. Most of the formal statements did not single out the United States as the cause of this arms race, but encouraged the two major space powers to negotiate limiting or reversing the race. The State Department briefing book did go so far as to allow the U.S. delegation to admit that the United States, too, was "concerned that there not be an arms race in outer space." U.S. reluctance to discuss the issue at this conference, particularly in the face of willingness to discuss it by all the other 93 countries there, appeared to many to be an effort to "stifle debate." Moreover, since the United States did finally agree to compromise language on the dangers of an arms race in space in the final report, its apparent obstructionism on the issue until the very end alienated some delegations. Willingness to discuss the issue, on the other hand, might have won the United States some credit, at least among its allies, for raising the level of the debate instead of stifling it.

The Soviets, for their part, positioned themselves before and during the conference to take maximum advantage of the U.S. refusal to address the "militariza-

*The State Department apparently expected attacks along these lines, but these did not appear in the country papers or opening statements of the governments that expressed concern about militarization.

**The language of the relevant paragraphs is as follows:

Paragraph 13: The extension of an arms race into outer space is a matter of grave concern to the international community. It is detrimental to humanity as a whole and therefore should be prevented. All nations, in particular those with major space capabilities, are urged to contribute actively to the goal of preventing an arms race in outer space and to refrain from any action contrary to that aim.

Paragraph 14: The maintenance of peace and security in outer space is of great importance for international peace and security. The prevention of an arms race and hostilities in outer space is an essential condition for the promotion and continuation of international cooperation in the exploration and use of outer space for peaceful purposes. In this regard, the Conference urges all States to adhere to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies and strictly to observe its letter and spirit.

Paragraph 426: The Conference strongly recommends that the competent organs of the United Nations—in particular the General Assembly and also the Committee on Disarmament—when dealing with measures aimed at a prevention of an arms race in outer space—in particular those mentioned in the relevant resolutions of the General Assembly—give appropriate attention and high priority to the grave concern expressed in paragraphs 13 and 14.

*The Algerian delegation raised this spectre when it got the following statement inserted into the conference report's "Summary of the General Debate":

Numerous delegations denounced the wrongful use of space technology, such as surveillance satellites, in cases of military conflict . . .

The paragraph cited "the aggression committed against Lebanon" and "the assistance provided to the aggressor" as a case in point. U.N., *Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*, Vienna, Aug. 9-21, 1982 (A/ CON F.101/10), p. 126, par. 525.

tion" issue. The sort of Soviet propaganda about the U.S. military space program cited above has gone largely unanswered by the United States.* At UNISPACE '82 itself, however, the Soviet Union had no need to direct charges specifically against the United States. Instead, it could and did merely express its sympathy with the widespread view that steps were needed to prevent the "militarization" of space, and point to its own proposal of August 1981 for a treaty to ban stationing weapons in space as an example of such a step. No accusation naming the United States was necessary, nor was any defense of the very large Soviet military space program with its active antisatellite weapons tests.

Had the United States chosen to debate the "militarization" issue, it might have been able to inform other nations of the massive Soviet contribution to the "militarization" of space, perhaps removing some of the wind from Soviet sails on the issue. Informally, some delegates tried to do this. Others wished that the State Department had "unleashed" them to do a more effective job of pointing out that it had been the Soviets, not the United States, who had been testing weapons in space for the last several years.

As tempting as this opportunity to paint the Soviets with their own brush might have been, however, it carried a major risk. Except for those countries that might be categorically opposed to the United States (and their number might not be as large as we sometimes feel), most of the countries concerned about the "militarization" issue are not simply interested in apportioning blame. Instead, they want the United States and the Soviet Union to agree to avert an arms race in space, no matter who "started it." An exchange of accusations with the Soviet Union over who was doing the most to "militarize" space might score some debating points for the United States, but at the same time would reinforce the general impression that there is indeed a burgeoning arms race in space about which something ought to be done.

Here, again, the Soviets seem to have seized the "high ground" on the issue. True, both sides have agreed that the U.N. Committee on Disarmament should discuss arms control in space. But the Soviets point out that it is the United States, not the Soviet Union, that has discontinued the negotiations on antisatellite weapon limitations. The United States has indicated a lack of willingness to resume those negotiations at any specific future date. It is the Soviet Union, not the United States, that has proposed (however disingenuously) at the U.N. a treaty to prohibit stationing weapons of any kind in orbit. Under these circumstances, the Soviet Union can present itself as addressing the concerns of the international community about an arms race in space while the United States belittles those concerns. And further debate about "militarization" at UNISPACE '82 would only have underlined these circumstances.

In other words, if the United States believes that actual negotiation on the question of arms in space is not in its best interests, its best strategy in the international fora may well be to "stonewall" the issue, to avoid debate on it as much as possible.

*For a variety of reasons: secrecy on U.S. program, reluctance to reveal knowledge and sources about Soviet program, desires not to have the subject openly debated.

## Conclusions

1. While the logic of the U.S. position at UNISPACE '82 on the question of the "militarization of outer space" may have been sound, the United States paid a diplomatic price for insisting on that position so inflexibly. Support for the United States in future international negotiations on militarization will probably be harder to get.
2. Although there was debate on the "militarization" issue despite U.S. wishes, some of the worst U.S. fears about the consequences of a UNISPACE '82 discussion of the issue did not materialize. The issue did not prevent the other work of the conference from going ahead. The United States was not generally singled out as the "leader" of the space arms race. The recommendations of the conference did not "introduce confusion into the work of expert negotiating bodies such as the CD." The space shuttle was not condemned as a weapon.
3. Soviet propaganda and diplomacy has positioned the Soviet Union vis-a-vis the United States very well on the space "militarization" issue. No matter who takes the "blame" for initiating an arms race in space (and Soviet propaganda works hard at saddling the United States with this blame), the United States bears the onus for refusing to negotiate on it (outside the Committee on Disarmament).
4. Given the fact that the United States has no position on further arms control measures for space, obstruction of discussion of the issue whenever possible may be the most "damage-limiting" strategy the United States can pursue.
5. Whether the perceived unwillingness of the United States to deal with this issue will interfere with future efforts to win international cooperation in space remains to be seen. Some members of the U.S. delegation to UNISPACE '82 came away with the feeling that the United States did

an excellent, if inadvertent, job of uniting the G-77 (developing nations) against the United States. This could have negative effects at later international negotiating fora such as the meetings of the International Telecommunication Union.

## Aftermath

The issue of the "militarization" of outer space will continue to be a problem for the United States. Other governments will continue to raise the issue at the U.N. and elsewhere, either because they see the United States as vulnerable to criticism, or because they genuinely fear the prospects of the arms race spreading into space. How other governments perceive the United States on this issue inevitably affects their attitude on other issues as well. Allies and others concerned about the course of the nuclear arms race may see the spread of the arms race into space as a part of the larger arms race problem. Developing countries may see the "militarization" of space as being of a piece with the "first-come first-served" approach to the geosynchronous satellite orbit: that is, the high-technology powers dispose of the "common heritage of mankind"—outer space—as they see fit, saying, "Trust us" to the rest of the world.

More subtly, in most multilateral negotiations there are informal "trade-offs" among issues, nations offering their support and votes on one question in order to get votes in return on another. As long as the United States remains in the international minority in its approach to "militarization of space," it will have to make diplomatic bargains to sustain its position. The net gains and losses from these bargains remain to be counted.

## Appendix B

# NASA's Approach to International Cooperation*

Since the space program of United States began, the National Aeronautics and Space Administration (NASA) has pursued a vigorous and successful[1] program of international cooperation, grounded in the National Aeronautics and Space Act of 1958.** One possible reason for NASA's success derives from a key feature of its cooperative efforts: while NASA has international programs, it does not fund *an* international program. There is no "international" line item in the NASA budget and no money set aside especially for international programs. Funding for international projects must come out of the budgets of the NASA program offices (essentially science, applications, space flight, and aeronautics). The Associate Administrators of the Program Offices and their managers are rated not on how many international projects they have, only on how successful they are in achieving their program goals. Thus, for an international approach to a project to be undertaken it must not only contribute to achieving the goals of the interested program office, but it must be considered to be among the best approaches to achieving those goals. The sole modification to this principle occurs when a major U.S. foreign policy objective can be effectively served through an international space cooperative project; even here, however, the project must be technically sound.

NASA recognizes that if a "national" and an "international" approach are rated about even technically and fiscally, the national approach will allow for easier management and greater resource efficiency. Thus, self interest and relative efficiency tend to guard against undertaking marginal international projects.

Another factor contributing to the success of NASA and its international programs is the requirement that the agency pursue an extremely high standard of technical excellence. In the space business, it is possible to build a spacecraft that is 97 percent perfect and still have a disaster. While most nonspace organizations would be overjoyed with that degree of success in a major development effort, it is inappropriate for high risk, high visibility projects which have frequently launched beyond man's ability to repair easily.[2] A great deal of senior management attention, time and money is spent making sure that the last 3 to 5 percent of a project is done correctly. The importance of this for international projects is that NASA managers want as much insight into them as they have into a NASA-only project. This dictates a principle of "keep it simple" in management and technical interfaces. This means that NASA prefers bilateral relations over projects that might involve three or more countries or organizations.

The concern with technical and scientific excellence also contributes to NASA's international programs in another fundamental way. From the very beginning the principal area of international space cooperation has been in the sciences. NASA made a decision early in its history to involve in its programs not only the best scientists in the United States, but also those from throughout the free world. After all, "science" means "possession and pursuit of knowledge," and the way to attain excellence is to work with the very best scientists. This may seem like a straight-forward approach, but it has marked a difference over the years between the science programs of NASA and the European Space Agency (ESA). Until very recently, ESA restricted direct participation in its own satellite projects only to European scientists.

In short, the basic character of NASA's international programs has stemmed significantly from the character of the agency itself and was set quite early: international projects would be undertaken only if they contributed to NASA's own program goals, foreign policy objectives would be supported, bilateralism would be the fundamental method of conducting international projects, and NASA's science programs would be open to participation on a competitive basis by the best minds from throughout the free world.

Three additional guidelines used in planning NASA's international programs deserve prominent mention. First, each cooperating nation is expected to assume full financial responsibility for its own efforts on a project; i.e., no exchange of funds occurs in either direction between NASA and the foreign cooperating agency. This rule serves to reduce considerably the cost of the projects to NASA and to ensure close project/

*Prepared by the International Affairs Office, NASA.

[1]See President's 1982 report to Congress on International Activities in Science and Technology (Title V).

**One of the objectives of the "Space Activities of the United States" is (sec. 102): "Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof."

[2]E. Hutchings, Jr., "The Autonomous Viking," *Science*, vol. 219, 1983, pp. 803-807.

budget responsibility. Second, whatever the division in responsibilities between the partners in a joint project, each side must have the capacity to carry out its own responsibilities. This principle was established to limit technology transfer to partners. In pursuit of this objective, NASA seeks to define cooperative projects so that the interfaces between the contributions are as well defined and "clean" as possible. Third, the results of scientific cooperative efforts are to be made openly available to the international scientific community within a reasonable period of time through appropriate channels (depending on the type of project).

Following these prescriptions, NASA has concluded over 1,000 agreements with over 100 countries in its 25-year lifespan.[3] These agreements are not generalized, umbrella-type arrangements, but rather cover the specific elements of a discrete undertaking. NASA's philosophy is that specificity avoids misunderstandings and discourages "inventing" projects to satisfy the spirit of a diffuse agreement. While a number of major satellite, experiment and facility development projects are included in these totals, many of the cooperative projects are for smaller efforts such as remote sensing investigations (with 53 countries), scientific and technical information exchanges (70; double counting of countries is involved here), geodynamics projects (43) and sounding rocket projects (22).

The importance of these "smaller efforts" should not be overlooked. Many of them have been with developing countries providing them with an opportunity to learn how to work with remote sensing data or how to build scientific payloads for sounding rockets or how to gain access to recent scientific reports in the open literature. One of the strengths of the bilateral approach to specific projects is that it facilitates cooperation with developed and developing countries on different sized projects at different levels of sophistication.

In addition to the scientific, technical, and political returns to NASA and the U.S. from this cooperation, over $2 billion in contributions have resulted from NASA's international cooperative programs. The amount grows to more than $3 billion when reimbursable services are included, such as for launching and providing tracking support for foreign satellites.

Statistical summaries are useful, but they also have a static quality which may not convey the dynamic nature of NASA's international cooperative programs. In fact, the NASA program is continually adjusted to reflect new situations and opportunities. For example, NASA's success in international participation became a political liability in 1980-81 when, in order to absorb its share of the administration's budget reductions, NASA found it necessary to reduce funding in one of its major science missions. The problem was that all three of the major ongoing science projects had significant international participation: Space Telescope (with ESA), Galileo/Jupiter orbiter probe (Germany) and the International Solar Polar Mission (ESA). This high degree of involvement of international participation in the science program meant that, for the first time in its history, NASA found it necessary to step back from an international commitment. NASA decided to terminate development of the U.S. satellite for the International Solar Polar Mission. The project was subsequently restructured to include only a single satellite built by Europe, to be launched by NASA on the space shuttle. Situations such as this may never be fully avoidable but they point up the necessity of carefully reviewing each prospective international project to assure, insofar as possible, its long-term merit. This is because the consequences of modifying or terminating an international project tend to be more far reaching and damaging to U.S. interests than with projects that are wholly national in character.

Limited funding also dictates that NASA cannot do everything there is to do of importance in space. Indeed, the expanding capabilities of other countries makes this unnecessary. A prime example is the upcoming return of Halley's Comet. After reviewing its options, the United States decided not to mount a mission to Halley's Comet. However, ESA, the Soviet Union, and Japan all decided to develop encounter missions. To provide important data and to assure that U.S. scientists and the world scientific community at large fully participated in this historic event, NASA organized of an International Halley Watch (IHW) program. IHW is an international network of ground based observatories that will provide significant scientific data but which will also provide ephemeris data important for assisting the three Halley encounter missions. In addition, the Space Telescope will make Halley observations from Earth orbit, as will three ultraviolet telescopes mounted on board Spacelab mission OSS-3 in the shuttle's cargo bay. Finally, NASA is sending the ISEE-3 spacecraft, which has successfully completed its primary mission through the Earth's magneto tail to make the first ever in-situ cometary measurements with comet Giacobini-Zinner in September 1985. These data will be useful in their own right but may also provide valuable insights for the encounter Halley missions in 1986. By sharing leadership for exploring the heavens with other qualified space-faring nations, NASA stretches its own resources and is free to pursue projects which, in the absence of such sharing and cooperation, might not be initiated.

[3] "A Review of NASA International Programs," NASA report, January 1983.

The space shuttle also presents NASA with the means to enter into new international cooperative opportunities. For example, during a visit to Sao Paulo on December 2, President Reagan invited a Brazilian payload specialist to fly aboard the space shuttle. The President's remarks were based on the revision in NASA policy announced October 22, 1982, expanding opportunities for foreign and domestic sponsors of payloads on the space shuttle to nominate payload specialists to fly with them. Training and flight of these payload specialists will normally be on a reimbursable basis, although in the case of cooperative missions, other specific arrangements may be made. Since the announcement, NASA has discussed the expanded policy with a number of its cooperative partners and reimbursable shuttle customers.

It is therefore quite likely that, beginning in late 1983 with the first flight of a foreign payload specialist on Spacelab 1 (Ulf Merbold of ESA), a continuing stream of foreign payload specialists will join U.S. astronauts on the shuttle.

In the same vein, the possibility of the United States developing a space station to be serviced by the space shuttle also opens up potential new opportunities for international cooperation. Space Station is not at this time an approved program. However, should such a project receive future approval, the possibility of international participation in its development and use is a prospect deserving serious consideration. Potentially interested governments are being kept advised of developments in the United States and some foreign studies paralleling U.S. exploratory efforts are underway. These studies are being funded by the foreign government without commitment on either side with respect to future cooperation.

In summary, the outlook for mutually beneficial international cooperation in space, both in the short and long term, is very good. As in the past, most of this cooperation will be conducted on a bilateral basis. Where multilateral efforts are manageable and make sense, however, they also will be vigorously pursued.

Appendix C

# Intergovernmental Meeting of Space Technology Experts

One of the seven proposals for multilateral cooperation that the United States presented at UNISPACE '82 was an intergovernmental meeting of experts in the use and management of space technology. Scheduled to be held just prior to the February meeting of the Scientific and Technical Subcommittee of COPUOS, its aim was to assemble as many representatives as possible from the world's space programs in order to discuss the current state of space technology and to present the many opportunities that exist for bilateral or multilateral cooperative ventures in space.

On February 4, 1983, NASA and Columbia University cosponsored the first such meeting, held at Columbia's School of International and Public Affairs. About 100 representatives from 40 countries and international organizations attended. About 15 developing countries were represented at the gathering. Although they had been invited, the Eastern Bloc countries were conspicuously absent, a fact that was lamented by speakers from several countries during the 2 days. Translation (French, Spanish, English) was provided, and the meeting was transcribed for future distribution. Copies of most speakers' papers were available during the meeting. Most of the time was scheduled with formal presentations; however, the organizers encouraged informal meetings and made several small meeting rooms available for this purpose.

Although it is impossible to evaluate the long-term effects of the meeting so soon after it was held, the presentations were generally of high quality and designed to illustrate the potential for cooperation. Representatives from industrialized countries, developing countries, and the United Nations (U.N.) presented talks. The meeting's emphasis was on technology; although political issues were raised and discussed, technical matters dominated the discussion.

The meeting ran smoothly and was generally successful in giving the United States an opportunity to reach other countries in an informal multilateral forum. According to the organizers of this meeting, future meetings could continue to focus on technical matters of interest to the world community; issues with a high percentage of political content could also be discussed as long as this meeting did not usurp the prerogatives of COPUOS. No decision was reached on the advisability of holding another such meeting.

The agenda, meeting place and timing of this experimental meeting were arranged by NASA and Columbia University. If future meetings are held, the international community must decide who will organize them, set the agenda and pay for them.

## Developing Country Questions and Needs

During the conference, participants raised the following questions, among others:

1. **What cooperative opportunities are available and how can countries obtain timely information about them?**

   This question was raised more than any other at the meeting. Each country follows different procedures for cooperative projects and announces them by different means. Although the U.N. attempts to keep abreast of these projects, it is not always aware of every opportunity.
2. **What instructional programs are available, and what channels does an individual follow to participate?**

   Not only do invidivuals and agencies in the various countries need to know *what* is available, they also need to know *how* to take advantage of the opportunities. It was suggested that 2-week workshops are not long enough, except to give individuals with previous training, instruction in the latest equipment and techniques.
3. **How can current knowledge be transferred to potential users in developing countries?**

   In addition to information on training and cooperative projects, developing countries also need timely access to data that could be of economic use (e.g., land remote sensing data or data on photoplankton distribution in the oceans).
4. **Developing countries need operating funds as well as initial capital for projects.**

   In many cases, it is not enough to carry out a demonstration project because the country may not have the resources to continue, even if the new technology is cost effective.
5. **Science programs can be an excellent means to involve individuals in space technology.**

   Although basic science projects do not necessarily lead to applications, they help develop the skills and infrastructure needed for applications programs.

6. **In developing courses of instruction, who determines the course syllabi?**

   Some courses are inappropriate for students from developing countries because they presuppose too much technical knowledge or equipment. Language problems present barriers, especially if the student is expected to learn a foreign language while studying within his or her own country. Several participants made the point that both problems can be overcome if the coursework and language study are well planned, and include advice from the participating countries.

7. **Perceived need for a service must preceed programs to use it.**

   This was counted essential for satellite technology to prosper in a given country. Several cases were reported where the lack of perceived need within the developing country resulted in a situation where substantial data were accumulated in-country by various programs and not used (e.g., remote-sensing data for mapping).

8. **Have we been over-optimistic about the potential to transfer technology to developing countries?**

   Here again, the distinction was made between demonstration projects and continuing use of the technology. Several participants expressed doubt about the speed with which new technology could be integrated into the social and economic structure of a developing country.

Appendix D

# Report on UNISPACE '82

## The United Nations Conference on the Exploration and Peaceful Uses of Outer Space

**Vienna, Austria, August 9-21, 1982**

**Subcommittee on Space Science and Applications**
**Committee on Science and Technology**
**U.S. House of Representatives**


## Summary

Ninety-four nations vitally interested in space attended the UNISPACE '82 Conference. Therefore, the United States was presented a great opportunity to demonstrate its progress in space for the benefit of all mankind.

The United States did not seize this opportunity. The United States instead adopted a defensive posture and did not adequately accentuate its past accomplishments nor demonstrate its willingness to aggressively pursue cooperative international space programs. Although it can be argued that the United States did succeed in protecting its interests in the conference, in some instances its public positions could be characterized as intransigent.

The single issue attracting most attention at UNISPACE '82 was "militarization of space." The United States virtually ignored this issue, for example in its plenary statement. This omission, following the President's July 4 space policy statement emphasizing military programs, signalled to many delegations that the United States is now mainly interested in military applications. Thus, an opportunity to accentuate the positive— the outstanding U.S. civil space program— was missed.

The second most discussed issue was allocation of the geostationary orbit. Less-developed nations expressed concern that because of physical limitations the orbit will be "filled" before they can take advantage of it, although the finite lifetime of satellites means that slots will continue to open if "dead" satellites are pushed out of the orbit. The United States asserted that technological advances will mitigate these limitations but did not effectively demonstrate to other delegations how this would occur.

The United States chose to spend only a few months preparing for the conference, and named its delegation only days before the conference began. Thus, in part our defensive posture may have been due simply to lack of preparation of the delegation.

During preparations for the conference, representatives of the Administration contended that the discussion would be technical and that political issues would not arise (e.g., this was stated at briefings and hearings). The opposite was true, the conference was highly political, and not just technical.

Congress could have been brought more effectively into the preparations for the conference. For example, Congress was given the "official" position on certain issues, and was not made privy to how the issues would be dealt with at the conference.

There was not enough private sector involvement in the Conference. Representatives of the entrepreneurial private sector should have played a larger role in UNISPACE because the future of the United States' civil space program probably lies largely in that sector, while in most other nations space is a nearly exclusive government function. As it was, few private sector representatives—delegates or exhibitors—were asked or allowed to participate substantively in the conference or in preparations for it.

Many delegations from developing nations seemed virtally interested in benefits space could bring to them, especially in communications and remote sensing. Several nations stressed the importance of LANDSAT data continuity.

At the same time, the developing nations were wary of possible negative impact of space technology on their nations interests even in communications and remote sensing. In communications, for example, concern was expressed that direct broadcasts from satellites to individual receivers would introduce unwanted information into their countries. Concern was also express that the "open skies" policy of the United States, i.e., nondiscriminatory assess to remote-sensing

data, would disclose secret information about the sensed country to its adversaries. The United States must address these inherently political issues.

The United States should recognize that United Nations conferences are a fact of international politics and plan to take advantage of them. These conferences must be prepared for carefully and wisely, and attended be a well-informed, coordinated delegation in order to best represent and advance U.S. interests.

Appendix E

# U.S. Delegation to the Second U.N. Conference on the Peaceful Uses of Outer Space (UNISPACE '82)*

***Representatives***

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Administrator
National Aeronautic and Space Administration

***Alternate representatives***

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Assistant Administrator for Program and Policy Coordination
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Anthony J. Calio
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Rep. William Carney
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Rep. George E. Brown, Jr.
U.S. House of Representatives

Rep. Daniel K. Akaka
U.S. House of Representatives

Rep. Wayne Grisham
U.S. House of Representatives

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Henry Hartsfield, Col., USAF
Astronaut
National Aeronautics and Space Administration

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General Counsel
National Aeronautics and Space Administration

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National Telecommunications and Information Administration

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Office of Advanced Technology
Bureau of Oceans and International Environmental and Scientific Affairs
Department of State

Kenneth S. Pedersen
Director
International Affairs Division
National Aeronautics and Space Administration

Gilbert Rye, Col., USAF
National Security Council

David Small
Office of the Legal Adviser
Department of State

John H. Storrie, Brig. Gen., USAF
Headquarters
U.S. Air Force

Norman Terrell
Assistant Director for Nuclear and Weapons Control
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***Private sector advisers***

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*Held at Vienna, Austria, Aug. 9-21, 1982.

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President
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Detroit, Mich.
Charles A. Schmidt
Division Vice-President and General Manager
RCA, Astro-Electronics
Princeton, N.J.

## Appendix F

# Attendance at the Conference

A. The following States were represented at the Conference:

Albania
Algeria
Angola
Argentina
Australia
Austria
Bangladesh
Belgium
Benin
Bolivia
Brazil
Bulgaria
Byelorussian Soviet Socialist Republic
Canada
Chile
China
Colombia
Costa Rica
Cuba
Cyprus
Czechoslovakia
Democratic Yemen
Denmark
Ecuador
Egypt
Finland
France
Gabon
German Democratic Republic
Germany, Federal Republic of
Greece
Guatemala
Holy See
Hungary
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Japan
Kenya
Kuwait
Lebanon
Lesotho
Libyan Arab Jamahiriya
Luxembourg
Malaysia
Mali
Mexico
Mongolia
Morocco
Netherlands
New Zealand
Nigeria
Norway
Pakistan
Panama
Peru
Philippines
Poland
Portugal
Qatar
Republic of Korea
Romania
Rwanda
San Marino
Senegal
Somalia
Spain
Sri Lanka
Sudan
Sweden
Switzerland
Syrian Arab Republic
Thailand
Tunisia
Turkey
Uganda
Ukrainian Soviet Socialist Republic
Union of Soviet Socialist Republics
United Kingdom of Great Britain and Northern Ireland
United Republic of Cameroon
United Republic of Tanzania
United States of America
Upper Volta
Uruguay
Venezuela
Viet Nam
Yugoslavia
Zaire
Zimbabwe

B. The United Nations Council for Namibia was represented at the Conference.

C. The following national liberation movements were represented by observers: African National Congress (South Africa), Pan-Africanist Congress of Azania.

D. Members of the secretariat of the following United Nations offices were present throughout or during part of the Conference:
- Centre for Disarmament
- Centre for Science and Technology for Development
- Department of Political and Security Council Affairs

E. The Secretariat of the Economic Commission of Africa was represented at the Conference:
- Economic Commission for Africa

F. The following United Nations bodies and programmes were also represented:
- United Nations Development Programme
- United Nations Environment Programme
- United Nations Industrial Development Organization
- United Nations Disaster Relief Organization
- United Nations Centre for Human Settlements (HABITAT)

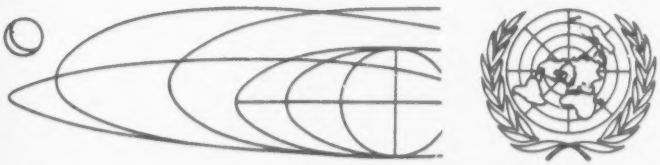
G. Representatives of the following specialized agencies and related organizations participated in the work of the Conference:
- Food and Agriculture Organization of the United Nations
- United Nations Educational, Scientific, and Cultural Organization
- International Civil Aviation Organization
- World Health Organization
- World Bank
- International Telecommunication Union
- World Meteorological Organization
- International Atomic Energy Agency

H. The following intergovernmental organizations were represented by observers:
African Remote Sensing Council
Agency for Cultural and Technical Cooperation
Arab Communications Satellite Organization
Council for Mutual Economic Assistance
Council of Europe
European Communities
European Space Agency
Intergovernmental Oceanographic Commission
Interim European Telecommunications Satellite Organizations
International Maritime Satellite Organization
International Organization of Space Communications, "INTERSPUTNIK"
International Telecommunications Satellite Organization
League of Arab States
Organization of African Unity
Pan African Telecommunication Union

I. A large number of concerned nongovernmental organizations in consultative status with the Economic and Social Council were represented by observers.

Appendix G

# Text Resulting From the Consultations of the "Friends of the President"



Distr.
LIMITED

A/CONF.101/L.4
20 August 1982

ORIGINAL: ENGLISH

*Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*

Vienna, 9-21 August 1982

Text resulting from the consultations of the "Friends of the President"

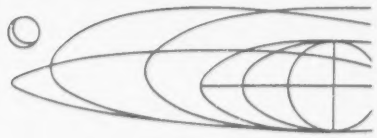
1. The extension of an arms race into Outer Space is a matter of grave concern to the international community. It is detrimental to humanity as a whole and therefore should be prevented. All nations, in particular those with major space capabilities, are urged to contribute actively to the goal of preventing an arms race in Outer Space and to refrain from any action contrary to that aim.

2. The maintenance of peace and security in Outer Space is of great importance for international peace and security. The prevention of an arms race and hostilities in Outer Space is an essential condition for the promotion and continuation of international co-operation in the exploration and use of Outer Space for peaceful purposes. In this regard the Conference urges all States to adhere to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies and strictly to observe its letter and spirit.

3. The Conference strongly recommends that the competent organs of the United Nations in particular the General Assembly, and also the Committee on Disarmament when dealing with measures aimed at a prevention of an arms race in Outer Space, in particular those mentioned in the relevant resolutions of the General Assembly, give appropriate attention and high priority to the grave concern expressed above.

Appendix H

# Proposal Submitted by Mexico on Behalf of the Group of 77



Distr.
LIMITED

A/CONF. 101/L.3
20 August 1982
ORIGINAL: ENGLISH

*Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*

Vienna, 9-21 August 1982

Proposal submitted by Mexico on behalf of the Group of 77

Statement

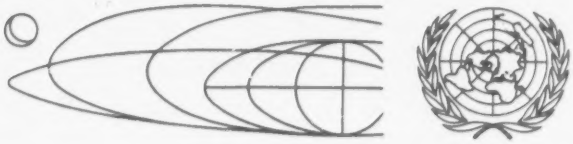
The Group of 77 firmly holds the view that activities in the field of remote sensing should be carried out in full respect for the sovereign rights of states. The Group of 77 believes that sensed states should have timely and unhindered access on a priority basis at nominal cost, to all data and information obtained over their territories. Dissemination of such data and information derived from it to a third party should not be done without the prior consent of the sensed country. The Group of 77 urges UNISPACE 82 to recommend, through the General Assembly, to the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee to finalize the work on the elaboration of draft principles concerning remote sensing of the earth from space as a matter of high priority.

The Group of 77 firmly holds the view that activities in the field of international direct television broadcasting through satellites should only be conducted in full respect for the sovereignty of states. In this regard the recognition by the international community of principles embodying a) broadcasting state's responsibility, b) prior consultation and agreement between broadcasting and receiving states and c) the radio regulations of the ITU, inter-alia, are of utmost importance. The Group of 77 welcomes the text of 16 nations' draft elaborating principles governing the use by states of artificial earth satellites for international direct television broadcasting. The Group of 77 regrets that this draft has not yet met with consensus and that even after ten years of efforts by COPUOS to finalize it have not been successful. The Group of 77 urges UNISPACE 82 to recommend that the General Assembly at its 37th Session approve a set of principles governing the use by states of artificial earth satellites for international direct television broadcasting in accordance with the 16 nations' draft, as aforementioned.

The Group of 77 firmly holds the view that the existing mechanism of the United Nations body dealing with outer space affairs should be strengthened. The Group of 77 urges that the United Nations through its competent organs strongly support programmes and activities of the developing countries and of regional, sub-regional and national interests relating to applications of space technology through training, education, technology transfer and expert technical advice.

Appendix I

# Declaration of the Group of 77



Distr.
GENERAL

A/CONF.101/5
13 August 1982

*Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*

DECLARATION OF THE GROUP OF 77

Group 77 nations met a few times to discuss some important issues having interconnexion with the over-all activity of the Conference and having bearing on the work of all Committees. The following positions have been arrived at:

(1) Group 77 nations are firmly of the view that the issue of militarization of Space is a matter of great concern. Group 77 nations urge that the Conference recommends that all Member Nations and, especially, those who have the capability, be asked to refrain from any activities which lead to the extension of arms race into Outer Space. Group 77 nations further reiterate that militarization of Space is detrimental to the entire humanity and hence extension of arms race to Outer Space, the moon and other celestial bodies that are the common heritage of mankind, should not be permitted. The position of the Group 77 nations is that testing, stationing and deployment of any weapons in Space should be banned. The Group of 77 considers necessary the adoption of a legal instrument that definitely bans the emplacement of weapons in outer space and verifiable controls and guarantees. In view of their special responsibility in this field, it is recommended that the two major space powers open negociations for an early agreement to prevent an arms race in outer space. Such negotiations should not inhibit or prevent the General Assembly from giving the necessary directives to the Committee on the Peaceful uses of outer space and the Committee on Disarmament for the urgent consideration of this question in conformity with the spirit of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

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NOTE: As part of the series of special demonstrations connected with UNISPACE 82, the original text of the present document, upon its receipt in Vienna, was relayed via satellite to United Nations Headquarters in New York, where it was translated, typed and subsequently beamed back to Vienna via satellite link.

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(2) Group 77 nations are fully convinced that the limited and scarce resources of the GSO and allied radio frequency spectrum should be optimally utilized for the benefit of all countries. Group 77 is of the firm view that the present regulatory mechanism for assigning orbit positions and radio spectrum does not ensure equitable access to this resource, and that developing countries are particularly at a disadvantage. Group 77 is, therefore, of the view that a change to this mechanism is called for. Group 77 notes that WARC-79 of the ITU examined this problem in detail and decided to convene a Special Conference and other Regional Conferences "to guarantee in practice for all countries equitable access" to the said resource and to agree on appropriate planning and other approaches to fulfil this objective. Group 77 considers that the principle of guaranteed and equitable access should be the essence of any new regulatory mechanism and should take into account the particular needs of the developing countries including those of equatorial countries.

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## Appendix J

# Formal Agenda of the Conference

1. Opening of the Conference
2. Election of the President
3. Adoption of the rules of procedure
4. Adoption of the agenda
5. Establishment of the main committees and organization of work
6. Election of officers other than the President
7. Credentials of representatives to the Conference
   (a) Appointment of the members of the Credentials Committee
   (b) Evaluation of the major developments in space science, technology and applications, and assessment of the usefulness of these developments so far
8. General debate (Plenary sessions, mostly presentation of national papers)
9. State of space science and technology (Committee I)
   (a) Review and projection of the current future state of science and technology for space research and applications
   (b) Evaluation of the major developments in space science, technology and applications and assessment of the usefulness of these developments so far
10. Applications of space science and technology (Committee II)
    (a) Evaluation of the current and potential applications of space technology, taking into account present and foreseeable national and international programmes in the areas of space research
    (b) Examination of the possibilities and mechanisms for enabling all States to benefit from space technology, bearing in mind their various levels of development, varying capacities to absorb new technologies and particular needs and priorities
    (c) Examination of the choices for utilizing space technology available to countries at various stages of technological growth and of the difficulties they face in this regard
    (d) Examination of the existing infrastructure and scientific and technological development in various countries, especially the developing countries, and of appropriate measures to augment their capabilities to develop space technology and facilitate access to such technology and to participate and cooperate in space activities so as to derive maximum benefit from space technology and its applications.
    (e) Examination of developments and system configurations appropriate to the use of space technology for education
    (f) Discussion of compatibility and complementarity between various satellite systems, including those used for remote sensing, meteorology, communications and navigation
    (g) Consideration of the implications of projected developments in the areas of space technology such as earth-orbiting solar power stations, space manufacturing, space transportation and manned space stations; consideration of the implications of the use of the geostationary orbit, the need and possibilities for optimizing that use, as well as of the measures to be taken to that end
    (h) Discussion of the nature of, an ways of protecting, the near-earth environment including the upper atmosphere and magnetosphere
11. International cooperation and the role of the United Nations (Committee III)
    (a) Consideration of reports on the nature and extent of the bilateral and multilateral cooperation in outer space activities
    (b) Consideration of reports on the activities of the United Nations, including its specialized agencies, and of other international organizations dealing with the exploration and peaceful uses of outer space
    (c) Evaluation of the role of the United Nations, its specialized agencies, other international organizations and programmes of bilateral and multilateral cooperation in order to ensure broad international cooperation on an equal basis
    (d) Evaluation of the role of the United Nations, in the realization of benefits of space technology for all countries and examination of the need and possibilities for enhancing this role
12. Adoption of the report of the Conference

## Appendix K

# Additional Contributors

The following individuals contributed to this study in a variety of ways. OTA is grateful for the assistance they gave:

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John Carver (Australia)
E. V. Chitnis (India)
William Coleman (Africa)
Grahame Davey (Fiji International Telecommunications Union)
Professor A. M. House (Canada)
Tomo Martelano (Yugoslavia)
Alla Massevitch (U.S.S.R.)
Salim Mehmud (Pakistan)
Mahindra Narain (England)
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Yash Pal (India)
Sunaryo (Indonesia)
V. S. Vereskchetin (U.S.S.R.)

## Appendix L

# Acronyms

| | |
|---|---|
| ASAT | — antisatellite weapon |
| CD | — U.N. Committee on Disarmament |
| CHM | — Common Heritage of Mankind |
| COMSAT | — U.S. Satellite Communications Corp. |
| COMSAT Act | — Communications Satellite Act of 1962 |
| COPUOS | — U.N. Committee on Peaceful Uses of Outer Space |
| CRS | — Congressional Research Service, Library of Congress |
| DBS | — direct broadcast satellite |
| DOD | — Department of Defense |
| ESA | — European Space Agency |
| FAO | — Food and Agriculture Organization |
| FCC | — Federal Communications Commission |
| G-77 | — Group of 77 |
| GSO | — geostationary orbit |
| IAF | — International Astronautical Federation |
| ICA | — International Communications Administration |
| INMARSAT | — International Maritime Satellite Organization |
| INTELSAT | — International Telecommunications Satellite Organization |
| ITU | — International Telecommunication Union |
| Landsat | — U.S. Land-Remote Sensing Program |
| LDC | — lesser developed country |
| MARISAT | — International Maritime Satellite Organization |
| MLA | — multispectral-linear array |
| MPS | — materials processing in space |
| MSS | — multispectral scanner |
| NASA | — National Aeronautics and Space Administration |
| NAS Act | — National Aeronautics and Space Act of 1958 |
| NGO | — nongovernment organizations |
| NIEO | — New International Economic Order |
| NWIO | — New World Information Order |
| OES | — Bureau of Oceans and International Environmental and Scientific Affairs |
| OSAD | — U.N. Outer Space Affairs Division |
| OTA | — Office of Technology Assessment |
| Prep. Committee | — Preparatory Committee formed by COPUOS to prepare conference report |
| RF | — radiofrequency |
| SPOT | — Systeme Probetoire Observationale Terrestriale (land remote-sensing system) |
| TM | — thematic mapper |
| U.N. | — United Nations |
| UNCSTD | — U.N. Conference on Science, Technology, and Development |
| UNDP | — U.N. Development Program |
| UNDRO | — U.N. Disaster Relief Organization |
| UNEP | — U.N. Environment Program |
| UNESCO | — U.N. Education Science and Cultural Organization |
| UNGA | — United Nations General Assembly |
| UNISPACE | — United Nations Conference on the Exploration and Peaceful Uses of Outer Space |
| USAID | — U.S. Agency for International Development |
| WARC | — World Administrative Radio Conference |
| WMO | — World Meteorological Organization |

## Office of Technology Assessment

The Office of Technology Assessment (OTA) was created in 1972 as an analytical arm of Congress. OTA's basic function is to help legislative policymakers anticipate and plan for the consequences of technological changes and to examine the many ways, expected and unexpected, in which technology affects people's lives. The assessment of technology calls for exploration of the physical, biological, economic, social, and political impacts which can result from applications of scientific knowledge. OTA provides Congress with independent and timely information about the potential effects—both beneficial and harmful—of technological applications.

Requests for studies are made by chairmen of standing committees of the House of Representatives or Senate; by the Technology Assessment Board, the governing body of OTA; or by the Director of OTA in consultation with the Board.

The Technology Assessment Board is composed of six members of the House, six members of the Senate, and the OTA Director, who is a nonvoting member.

OTA currently has studies underway in nine program areas: energy and materials; industry, technology, and employment; international security and commerce; biological applications; food and renewable resources; health; communication and information technologies; oceans and environment; and science, transportation, and innovation.

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